The Political Economy of Biofuels and Farming: The Case of Smallholders in Tanzania

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Abstract

Following decades of neoliberal policies promoting commodity driven export production, the small scale farming sector in many developing countries has suffered from declining market share, lessening productivity and deepening poverty. In recent years, biofuels have been promoted within developing countries to foster rural development and provide new markets for the smallholders. Using Tanzania as a case study, this thesis evaluates the extent to which the emerging biofuel sector provides opportunities for smallholders to gain beneficial access to markets – or whether the sector is following the trajectory of other export-oriented commodity projects of the past and resulting in the marginalisation of smallholders. This thesis asserts that the biofuel sector in Tanzania presents more threats than benefits for smallholders; a pattern can be witnessed that favours foreign investors and dispossesses farmers of existing land, while providing few opportunities at a local level for income generation and employment.

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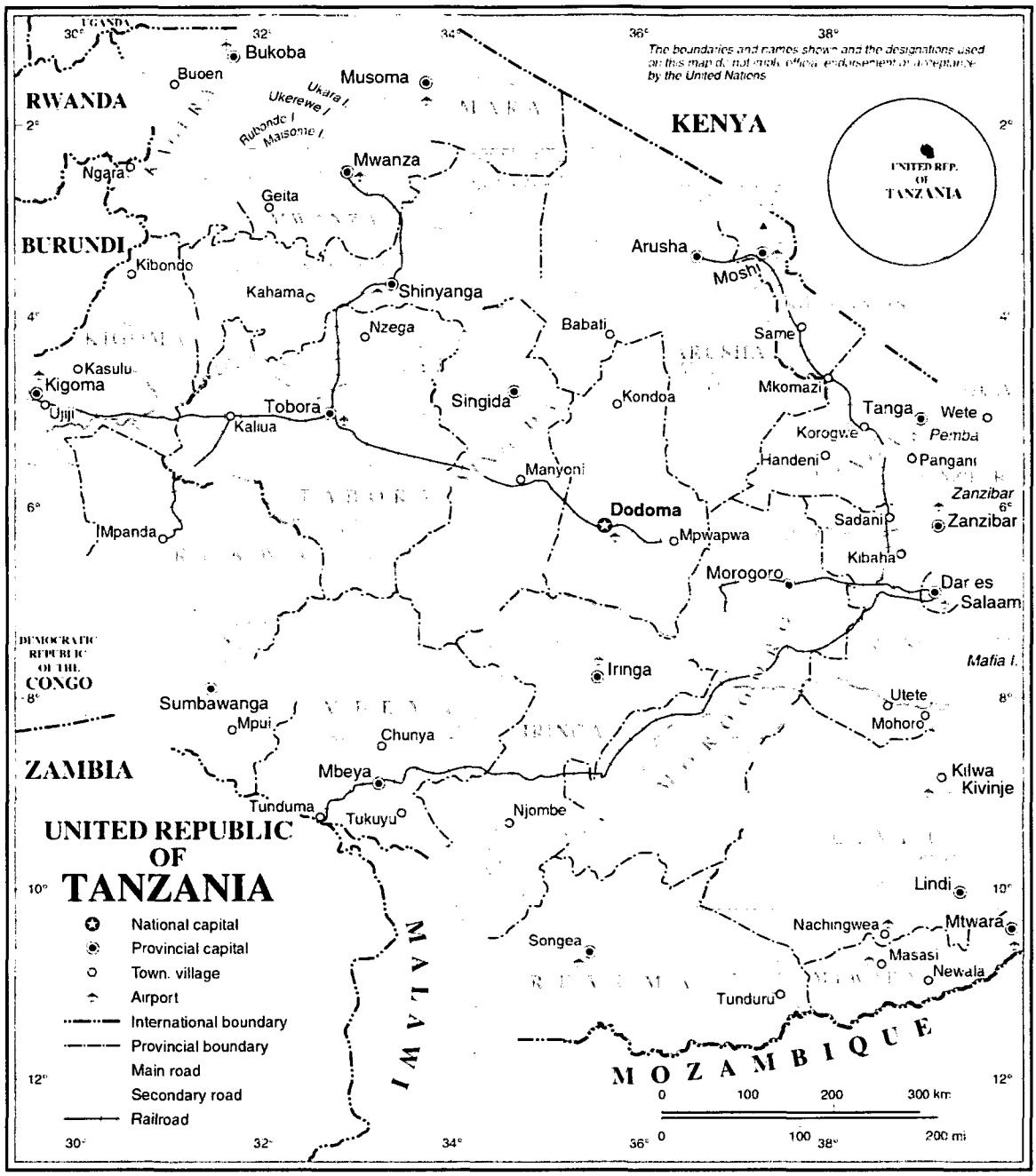
List of Abbreviations

ABN	African Biodiversity Network
ABRDC	Agribusiness Research and Development Centre
ADM	Archer Daniels Midland
AfDB	African Development Bank
ARD	Agricultural Research and Development
BAFF	BioAlcohol Fuel Foundation
BEFS	Bioenergy and Food Security Project
BEST-RAY	Bringing Energy Services to Rural Areas
CAMARTEC	Centre for Agricultural Mechanization and Rural Technology
CBO	Community Based Organization
CFC	Common Fund for Commodities
CFC	Community Finance Company
CGIAR	Consultative Group for International Agricultural Research
CIFOR	Centre for International Forestry Research
DFID	Department for International Development (UK)
DOSI	*Dutch Stichting het Groenewoudt*
EIA	Environmental Impact Assessment
Envirocare	Environmental, Human Rights Care and Gender Organization
ESIA	Environmental and Social Impact Assessment
ETC	Export Trading Company Limited
EU	European Union
EWURA	Energy and Water Utilities Regulatory Authority of Tanzania
FAO	Food and Agriculture Organisation
FDI	Foreign Direct Investment
FELISA	Farming for Energy for Better Livelihoods in Southern Africa
FOE	Friends of the Earth
FOEE	Friends of the Earth Europe
GDP	Gross Domestic Product
GGWG	Green Garden Women's Group
GHG	Greenhouse gas
GNI	Gross National Income
GTZ	*Deutsche Gesellschaft für Technische Zusammenarbeit* (German Technical Corporation)
Ha	Hectare
HAKIARDHI/ LARRI	Land Rights Research and Resources Institute
HDI	Human Development Index
HIMAWAMO	*Hifadhi Mazingira Wanawake Monduli*
HIPC	Highly Indebted Poor Countries
ICRISAT	International Crops Research Institute for the Semi-Tropics

IEA	International Energy Agency
IFAD	International Fund for Agricultural Development
IFI	International Financial Institution
IFPRI	International Food Policy Research Institute
IIED	International Institute for Environment and Development
IMF	International Monetary Fund
IOPA	Institute for Orkornerei Pastoralists Advancement
IRA	Institute of Research Assessment
IUCN	International Union for the Conservation of Nature
JANI	Jatropha Agriculture and Nutrition Initiative
JDI	Japanese Development Institution
JET	Journalists for the Environment
JOLIT	Joint Oxfam Livelihoods Initiative for Tanzania
JPTL	Jatropha Products Tanzania Limited
KAKUTE	*Kampuni ya Kusambaza Teknolojia* (The Technology Extension Company Ltd.)
KBC	Kilimanjaro Biofuels Corporation Limited
LDC	Least Developed Country
LIFDC	Low Income Food Deficit Countries
MAFSC	Ministry of Agriculture, Food Security and Cooperatives
MEM	Ministry of Energy and Minerals
MFP	Multi-functional platform
MFP	Ministry of Finance and Planning
MoU	Memorandum of understanding
NBS	National Bureau of Statistics
NBTF	National Biofuels Task Force
NEP	National Environmental Policy
NEMA	National Environmental Management Act
NGO	Non-governmental Organization
NORAD	Norwegian Agency for Development Cooperation
NSGRP	National Strategy for Growth and Reduction of Poverty
NTAE	Non-traditional Agricultural Exports
OECD	Organisation of Economic Cooperation and Development
PFD	Partners for Development
PISCES	Policy Innovation System for Central Energy Security
ProBEC	Programme for Basic Energy and Conservation
PRSP	Poverty Reduction Strategy Paper
REA	Rural Energy Agency
REF	Rural Energy Fund
RSB	Roundtable on Sustainable Biofuels
SADC	Southern African Development Community
SAP	Structural Adjustment Proogramme
SARI	Seliani Agriculture Research Institute Arusha
SEKAB	Swedish Ethanol Chemistry
SIDA	Swedish International Development Agency
SJO	Straight Jatropha Oil

SME	Small and Medium Enterprises
SSA	Sub-Saharan Africa
SSEA	Social Services and Environmental Association
STEM	The Swedish Energy Agency
SVO	Straight Vegetable Oil
TANESCO	Tanzania Electricity Supply Company
TaTEDO	Tanzania Traditional Energy Development and Environment Organisation
TIC	Tanzanian Investment Centre
TIRDO	Tanzania Industrial Research and Development Organisation
TNC	Transnational Corporation
TPDC	Tanzania Petroleum Development Corporation
Tsh	Tanzanian Shilling
TSPA	Tanzania Sugar Producers Association
TZ	Tanzania
UCLAS	University College of Land and Architectural Studies
UN	United Nations
UNDP	United Nations Development Programme
UN DESA	United Nations |Department of Economic and Social Affairs
UNESCO	United Nations Educational Scientific and Cultural Organization
UNIDO	United Nations Industrial Development Organisation
URT	United Republic of Tanzania
USAID	United States Agency for International Development
USDM	University of Dar es Salaam
VAT	Value Added Tax
WB	World Bank
WDR	World Development Report
WWF	World Wide Fund for Nature
WWF-TPO	World Wide Fund for Nature Tanzania Programme Office

Map of the United Republic of Tanzania



Map No. 3667 Rev. 5, January 2005, United Nations
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Chapter 1: Introduction

1.1 The Development Problematic: Agricultural Strategies and Smallholders

Agriculture in much of the developing world is characterised by uneven patterns of rural economic development for countries that more actively participate in global agricultural export markets. Despite increasing urbanization throughout the world, most people in developing countries are still dependent on agriculture for their livelihood. Three out of every four people in developing countries live in rural areas, with 880 million living on less than $1 US a day and 2.1 billion living on less than $2 US a day (World Bank, 2007).

The small scale farming sector has been plagued by decreasing market share, lowering productivity, increasing poverty and larger numbers of farmers shifting away from agricultural activities to earn income. In Africa, in particular, the last three decades has seen the erosion of smallholder farming due to its exposure to volatile global commodity markets and reduction of state support and foreign aid to agriculture, resulting in a decline in productive infrastructure, services and incentives for small producers (Havnevik et al., 2007). Early investment in agricultural input packages and extension support was reduced significantly in most of rural Africa with the adoption of Structural Adjustment Programs (SAPs). Within global commodity markets, smallholder producers have been steadily losing market share. Traditional export crops such as coffee, cocoa, tea, cotton, tobacco and cashews have declined to negligible levels in terms of exports. Large scale producers, comprised of a rural elite of commercial farmers and foreign plantation and estate owners, have expanded control over rural lands (Havnevik et al., 2007).

Per capita food production has also declined over the last two decades. Africa was once self-sufficient in the production of cereals but has now been forced to import millions of tons. However, smallholders still account for approximately 33 million or 80 percent of all farms in the region, with two-thirds below 2 hectares and 90 percent below 10 hectares (Altieri and Koohafkan, 2008).

In the face of the recent food crisis precipitated by rising food prices, many people have come to question the wisdom of pursuing large scale corporate agriculture and monocrop production. Even mainstream development practitioners are highlighting the need to boost small scale production. In recent years, African governments and the donor community have emphasized the importance of smallholder agriculture, pledging to make the necessary interventions in order to generate agricultural growth (Resnick, 2004). The World Development Report (WRD) 2008 itself focuses on smallholder agriculture and the need to increase its productivity and provide support for subsistence producers (World Bank, 2007).

Although there is recognition that increasing production of export crops has marginalised poor producers competing in stagnating agricultural markets, export production has continued to be promoted as a viable development approach. With the sharp decline of those agricultural commodities labelled as traditional, attention has shifted to non-traditional agricultural exports (NTAEs). Non-traditional export cropping has been considered a panacea for small producers looking to advance into more lucrative export markets in light of the trends mentioned above.

Within this context of growing unease about the state of agriculture generally and in particular, the small scale farm sector, biofuels have emerged as the latest group of

crops promoted to generate income and reduce poverty. As alternative energy sources have been increasingly promoted in Western countries, both public and private sources of financial support for biofuels have expanded substantially (Sulle and Nelson, 2009).

Sub-Saharan Africa has been described as having the potential to become the fastest growing biofuel region in the world. In recent years foreign companies, particularly from Europe, have surveyed the continent and signed agreements with national governments to produce biofuels on a large scale. Some estimates indicate that in (The United Republic of) Tanzania, nearly half of the country's area would be suitable for biofuel expansion. The country has witnessed a great deal of large scale investment, accompanied by a number of small scale initiatives involving the production of the Jatropha crop, which is promoted as especially suitable for small scale production. Tanzania has received international attention both for its controversial large scale land deals and praise for its promotion of small scale initiatives. It is therefore important to study this country to understand the potential for small scale production of biocrops in the region and to assess the extent to which the industry has developed similarly to other agricultural commodities in the past or shows signs of following a different trajectory.

1.2 Background: Biofuels

Biofuels are solid, liquid or gaseous fuel produced either directly or indirectly from organic material for purposes such as transport, heating, electricity generation and cooking. They can be produced from agricultural and forest products or from commercial, domestic or industrial wastes. First generation biofuels refer to the fuels that have been derived from sources like sugar, starch, animal fats and vegetable oil. The two

main types of biofuels are bioethanol and biodiesel, which are the focus of this study and account for more than 90 percent of global biofuel use (Cotula, Dyer and Vermeulen 2008a: 8). Bioethanol[1] is an alcohol-based fuel that is derived from starchy or sugary organic substrates and can be blended in low concentrations with petrol and used in conventional petrol vehicles or used in higher concentrations in specially modified petrol vehicles. It is produced from carbohydrate-rich plants such as sugarcane, maize, beet, cassava, barley, oats, wheat and sorghum. Biodiesel[2] is derived from oily matter and can be burned directly but is most often blended with fossil-based diesel fuels and is produced from oily crops or trees such as rapeseed, sunflowers, soy, palm, coconut and Jatropha or from animal fats or recycled greases. When blended in relatively small quantities with existing petroleum fuels for use in unmodified internal combustion engines, they can be used for transport.

Second generation biofuels are being developed based on the conversion of agricultural and forestry wastes or the conversion of lignocellulosic substances into energy that rely on a number of more sophisticated technologies. This study will focus only on first generation liquid biofuels and the term biofuels will hereafter refer to bioethanol and biodiesel derived from plant matter.

1.2.1 Choice of Feedstocks

Ethanol was first produced approximately 100 years ago, but it was the oil shock of the 1970s and the promotion of a more environmentally acceptable fuel that led to its

[1] It is produced by fermenting the sugar components of plants, followed by ethanol recovery, usually by distilling and refining the ethanol using sieves.
[2] It is produced by a chemical reaction known as transesterification whereby oil or fat is converted to biodiesel in the presence of an acid or base catalyst and alcohol (methanol or ethanol). The biodiesel is separated from glycerol and refined after conversion.

rapid growth and consumption. Currently, Brazil and the United States account for most of the world's ethanol production, with Brazil using sugarcane as a feedstock and the United States mainly growing corn. Ethanol is produced in much greater quantities than biodiesel. While bioethanol production is on the agenda of many countries, so far the total augmentation in production has been small relative to the combined capacity of the US and Brazil. The largest increases in volume are expected to be from Brazil, the US, the European Union (EU), China, India, Indonesia and Malaysia; annual global production is projected to increase to 120 billion litres by 2020 (IEA, 2004). Sugarcane currently accounts for the largest acreage of bioethanol production, supplying 40 percent of global production. Sweet sorghum is also being promoted as a 'promising alternative' due to the low production costs incurred, its drought resistance and suitability for small scale cultivation (Dufey et al., 2007). Currently, global ethanol production is estimated at over 40 billion litres, accounting for approximately less than 2 percent of total petrol consumption (Amigun et al., 2008).

While biodiesel is produced at much lower levels than bioethanol, substantial amounts of oilseed such as rape and soybean are processed into biodiesel in the EU, the US and Canada (Takavarasha et al., 2005). Global biodiesel production is projected to increase to 12 billion litres by 2020 (International Energy Agency, 2004). The EU produces almost 95 percent of the world's biodiesel, with rapeseed oil its main feedstock (Trostle, 2008). As biodiesel has being increasingly promoted throughout the world, countries as dispersed as Uruguay, Thailand and Ghana may potentially take the lead in a biodiesel industry estimated at $51 billion US to displace approximately 4-5 percent of the current global petroleum-diesel consumption (Srinivasan, 2009). Increases in

production are also expected from Malaysia and Indonesia, which supply to EU markets (Peskett et al., 2007). Although biodiesel is being increasingly promoted for its projected environmental benefits relative to bioethanol production, its higher cost remains a major obstacle to its commercialisation in many parts of the world. Biodiesel feedstocks are encouraged because they require "less extensive tracts of land for efficient production than do bioethanol feedstock, and may be grown in combination with other crops" (Dufey et al., 2007: 10).

1.2.2 Biofuel Expansion

Biofuel production has expanded dramatically in recent years, but still accounts for less than 3 percent of the global transportation fuel supply (Coyle, 2007). Until recently, biofuel production was not reflected in most government policies. With the oil crisis, large scale production of liquid biofuels began in the early 1970s in Brazil and the US. From that point until the mid 1990s, Brazil was considered to be the only country that 'successfully' produced significant quantities of liquid biofuels (Mol, 2007: 297). At that time, liquid biofuel production was typically undertaken to supply the home country with domestically produced biofuels; this strategy was often motivated by the need to reduce import bills and enhance energy security (Peskett et al., 2007). As the market for biofuels for transportation has expanded, developing countries have been identified as potential producers with a comparative advantage and the land available to provide for increasing world demand (Howse et al., 2006).

Governments such as China, India, Brazil, the US and the EU have been setting targets for biofuel production or use and have encouraged biofuel investment through

provision of financial incentives such as subsidies and tax breaks (Jull et al., 2007). Many of the targets have been mandatory, placing legal obligation on fuel companies to use a certain percentage or volume of biofuels to blend with petrol and diesel (Bailey, 2008: 5). The European Commission has proposed that all member states meet 10 percent of their transport energy needs through renewable energy sources by 2020. Similarly, the US mandated, through the 2007 Energy Independence and Security Act, the annual use of 36 billion gallons of renewable fuels, consisting mainly of ethanol by 2022. The Renewable Fuels Bill in Canada gives the government authority to develop regulations for renewable fuels and mandates 5 percent bioethanol in gasoline by 2020 and 2 percent biodiesel in diesel by 2012 (Bailey, 2008: 6).

According to figures from the International Energy Agency (IEA), it is estimated that current biofuel production could dramatically increase, with its share in global transport energy consumption rising from just over 1 percent to approximately 5 or 6 percent by 2020 (IEA, 2004). Land used for the production of biofuels may, according to the Food and Agricultural Organization (FAO), rise from its present level of 1 percent of the world's arable land to up to 3 percent by 2030 and perhaps to a high of 20 percent by 2050 (Raswant et al., 2008).

1.3 Research Objective, Research Questions and Hypothesis

Biofuels have been promoted within developed countries predominately to reduce growing dependence on fossil fuels and meet global commitments to reduce greenhouse gas emissions. Within developing countries biofuels have been aggressively promoted ostensibly to promote rural development, energy security and environmental benefits. It

is encouraged as a viable development opportunity for developing countries that can put idle, under-utilized or marginal lands to productive use while providing small scale farmers with access to high value markets and employment for the rural poor. Proponents of biofuels contend that biofuel production is especially suited to Southern and Eastern Africa as land is abundant in many countries. Small scale production has increasingly been promoted as an alternative to large mono-cropping in this region, by many advocates of biofuel production, to avoid competition over land use for food versus land use for biofuels. In reality, biofuel expansion has been aggressively pursued by transnational companies through the promotion of large scale monocropping and industrial agriculture. This has certainly been the case with the production of feedstocks such as sugar cane. Even for those feedstocks that have been promoted due to their suitability to small scale production, such as Jatropha, production has often been promoted by agribusiness, typically from European countries trying to reach biofuel targets. Many academic analyses reveal that the tendency towards externally promoted, export-oriented agriculture in developing countries has resulted in the dispossession of rural peasants, the concentration of land into the hands fewer landholders (Akram-Lodhi, 2007; Goodman and Watts, 1997) and, at best, the incorporation of some small scale producers into this production system through contracts under terms that are disadvantageous to the rural poor (Little and Watts, 1994).

In the aftermath of the latest food crisis (2007-2008), development analysts have become increasingly wary of promoting unregulated large scale monocropping and have instead emphasized the benefits of biocrop production for small scale producers to take advantage of high-value markets through incorporation of biofuel feedstocks within

existing food production systems (eg. Peskett et al., 2007; Cotula et al., 2008a; IIED, 2008; UN DESA, 2007; FAO/PISCES, 2009; Rossi and Lambrou, 2009). Therein lies the dilemma. While opportunities appear to exist for biocrop production for small scale producers, the biofuels sector has evolved in contradiction to its claims of rural development and poverty alleviation. In Tanzania, biofuels have been promoted among smallholders to help meet domestic energy needs, but production has been largely driven by external demand for renewable fuels.

An increasing body of literature has begun to deconstruct the experiences of local developing country economies with biofuels (see Dufey et al., 2007; Ewing and Msangi, 2009; Kojima and Johnson, 2006; Peters and Theilman, 2008; von Braun and Pachauri, 2006; Bailey, 2008; Eide, 2008; FAO, 2008a; Gallagher, 2008; Peskett, et al., 2007). There have been analyses of the consequences of increased production of non-food crops on the environment, local food markets and access to land (see Mol et al., 2007; Sexton and Zilberman, 2008; Naylor et al., 2007; Ringler, 2008; Rosset, 2009; Clements, 2008). Studies have increasingly examined biofuel production and provided policy prescriptions to encourage the production of biofuels on a smaller scale and in a manner that does not interfere with food production, but the emerging reality is still rather unclear. Despite increasing rhetoric from research institutions, multilateral and bilateral donors, national governments and even corporations supporting the small scale production of biofuels, one must ask whether or not smallholders are becoming involved in growing biofuel markets and if so, how? The study therefore seeks to address this research questions:

How has biofuel production benefited small scale producers in Tanzania?

Will small scale producers benefit from future biofuel production in Tanzania?

The hypothesis of this study is that within the current global market system, few opportunities exist for smallholders in Tanzania to integrate fully into biofuel markets and benefit from biofuel expansion, which is still largely driven by industrialised countries and dominated by large, powerful investors.

1.4 Conceptual Framework

The research question will be addressed through a qualitative, case study approach. The study will focus on biofuels in Tanzania, which has promoted the production of Jatropha for smallholders to a greater extent than other countries in the region. Growth in this sector has occurred within a complex array of economic, political and social forces both at the national and international level.

This political economy of biofuels and farming examines the orthodox or neoliberal paradigm of the free market in the context of the promotion of biocrops. Drawing strongly on critiques of the neoliberal agenda, this study provides insights into the extent to which biofuel expansion is a departure from export promotion policies or has the potential to contribute to agricultural sector development and economic opportunities for the rural poor.

The study will examine the forces that influence the biofuel making process in Tanzania to determine whether policies currently being formulated at the national level to regulate an emerging market will encourage the involvement of smallholders in the high-value markets or will instead further consolidate land holdings into the hands of a few

agricultural investors, agribusinesses and large landholders. It will then detail institutional and structural barriers that exist which, in spite of government, investor and NGO attempts to promote smallholder involvement in the sector, may prevent the successful integration of smallholders.

1.5 Methodology

Case Study Selection

Tanzania is quickly becoming a site for biofuel expansion and is considered one of the top countries in Africa attracting biofuel investment (FAO, 2008a). News articles and research papers detail the contested purchase of land by foreign multinationals for biofuel production and 'success' stories of smallholder producers diversifying their export portfolio through cultivating biocrops. Tanzania is important to study, as it will surely be a site of enormous biofuel expansion in the future. Further, as one of the leading biofuel producers in the continent, Tanzania provides lessons to be learned about the expansion of biofuels in other areas of Africa.

While biofuel policy is still in its earliest stages in the country, by examining the structure in which expansion has occurred and making comparisons between the earlier promotion of 'non-traditional' crops such as castor and moringa in Tanzania, the study will be able to speculate on the impact of evolving biofuel markets on smallholders.

Methods and Data Collection

To understand the problematic, a case study approach is used which will require the use of literature in agricultural development, particularly focusing on six debates

relating to the role of smallholders in global agricultural systems. The level of analysis will be predominately at the national level, focusing primarily on national government strategies as well as policy proposals and statements. It will, however, also focus on the international biofuel environment and its impact on national policy making.

The study will first briefly summarize the biofuel environment in Tanzania. It will analyse Tanzania's biofuel industry in relation to the global context and the debate over biofuels that has been evolved in the country among the government, civil society organisations, researchers, foreign and domestic investors, international donors and financial institutions.

It will then detail the national policies relating to biofuels in Tanzania through energy policies and national biofuel policies, both operational and yet to be implemented, and explore the extent to which biofuels policies incorporate strategies for mainstreaming or supporting smallholder involvement in the sector. It will analyse policy and legislative initiatives that have been developed including measures to promote private investment in bioenergy industries and financial assistance to both public and private investors from national, bilateral or multilateral bioenergy projects. These initiatives will then be analysed to ascertain the extent to which they promote small scale or large scale biofuel projects. The study will determine the extent to which policies attract foreign investors and examine the support provided by international organisations and governments and the implications for smallholder involvement in the sector.

To provide a wide-ranging picture of expansion in the country and its current and future impact on smallholders, a systematic review of feasibility studies and policy and project documents by governments, corporations, development agencies, UN

organisations, NGOs and researchers on an international and national basis will be undertaken. The following types of information are utilised: statistics from National Survey Samples and Censuses; data offered by civil society research bodies; books and working papers of academics and practitioners; scholarly journals; reports by civil society organizations and international agencies; and local, regional and national-level news sources.

This data is collected to provide an overview of the policies being developed, the projects being implemented and the direction in which the sector is developing. The research does not attempt to quantify the number of projects in existence as that is beyond the capacity and scope of this project given that limited information is available.

Operational Questions

To provide the institutional and structural setting, this study addresses operational questions pertaining to Tanzania's biofuel environment. Specifically the study will examine policies to determine the extent to which official policy and practice promotes the production of biofuels more conducive to small farmer production or more capital intensive (less labour-intensive) biofuels.

The questions include:

a) What provisions/protections are existent in biofuel policies to address risks associated with energy crop production such as high food prices, loss of access to land and unfair business practices?

b) What mechanisms exist to limit the production of energy crops on land required for food cultivation?

c) Are there limits imposed to the size of plantations allowed or amount of land that can be appropriated by foreign investors?

d) Who is involved in the formulation of policies relating to the biofuel sector?

The study will then collect information on biofuel initiatives being planned or in operation. While it is difficult to attain accurate information on all biofuel projects in Tanzania due to a lack of centralised monitoring of initiatives, the study will provide information on the following aspects of the sector:

a) Who is driving biofuel expansion in the region and what role have the various stakeholders such as international donors, NGOs and foreign and domestic investors and researchers played in promoting biofuel production in the country?

b) What crops are being promoted, and through what mode of production?

c) Is biofuel production being promoted primarily for export or for local consumption?

d) Are smallholders being integrated into asymmetrical or precarious contractual production schemes or being supported to produce biofuels in a self-sustaining manner?

e) Have existing production schemes strived to integrate smallholders or have they instead displaced small scale producers from their land?

Limits and Scope of Analysis

As reflected in research questions, this study focuses on the debate over biofuels as a viable, pro-poor solution for small producers suffering from declining returns. It is

not concerned with broader questions relating to energy policies or environmental implications. The study sets out to determine whether or not biofuel production as it is developing in Tanzania enables, or will enable in the future, the participation of small, domestic producers in a sustainable manner or if it contributes to, or will contribute to, food insecurity and appropriation of land by larger producers, thereby increasing poverty.

Although there are limitations associated with the use of secondary source data, this chiefly macro study aims to provide a broad overview of biofuel development in the country based on public data and information. Given the scope of analysis, field research was unfortunately not feasible due to the funding and time required. By examining a wide variety of sources from disparate stakeholders in the biofuel debate in Tanzania, the study is able to draw conclusions about the state of biofuel investment in the country - potentially forecasting the way in which biofuel expansion may occur in other countries.

There are challenges associated with a study such as this. Biofuel production has only recently expanded in Africa, with many countries attempting to position themselves as major biofuel producers. Most countries in the region, therefore, do not have formal biofuel policies or strategies and many have not even issued government sponsored biofuel studies. In countries that have made biofuels a priority, biofuel policy is evolving as more research emerges concerning the success/failure of particular biofuel feedstocks and therefore current policy will not necessarily be indicative of policies to come in the next 10-20 years. Both private sector initiatives and government biofuel projects will be subject to ongoing dialogue and debate (Sulle and Nelson, 2009).

While there is more information about biofuel investments in Tanzania compared to other countries in the region, there are definite gaps in the provision of information

about the industry, inconsistencies in data and a lack of transparency from biofuel investors and the government about the current status of biofuel projects and future plans. The industry is still largely speculative, with the potential for high profits and high risks and therefore investment patterns are, according to an International Institute for Environment and Development (IIED) study of biofuels in the country, expected to remain highly volatile (Sulle and Nelson, 2009). Many projects in early stages of either planning or development have been initiated only to be abandoned or delayed. This trend is likely to continue as market and fiscal conditions both globally and nationally continue to change (Sulle and Nelson, 2009). Finding current data on the number of existing projects or those being planned is unfeasible since information about many agreements is not available publicly. Information about the status of individual projects is especially difficult to obtain and articles generally focus on large scale initiatives and the politics of biofuels (Martin et al., 2009). Thus, an early assessment of the potential opportunities or adverse impacts on smallholders is possible at this time.

1.6 Structure of the Discussion

Chapter two presents a brief theoretical overview of emerging biofuel discourse. It then discusses smallholders and integration into biofuel markets within the context of six key debates within agrarian debate: (1) rural poverty and export-oriented commercial agriculture; (2) small versus large scale farming; (3) industrial agriculture/monocropping versus agroecology/multi-cropping; (4) rural poor households' subsistence versus transnational companies' profits; (5) small scale farming with land access versus dispossession/adverse incorporation; and (6) competing meanings about land and notions

of idle, under-utilized and marginal lands. Chapter three provides a brief summary of biofuel production in Sub-Saharan Africa and then presents the data collected on biofuel development in the sector. The last chapter offers a synthesis of the theoretical review and the data to determine the answer to the research and operational questions posed by the study. It will then conclude with a summary of key points of the thesis, the challenges facing smallholders in biofuel markets and suggestions for future research.

Chapter 2: Theoretical Exploration: Framing the Biofuel Debate

Introduction

This chapter first provides a brief overview of the biofuel discourse as it has emerged in relation to the involvement of smallholders in developing countries. It then discusses and analyses six contentious agrarian debates in developing countries to illuminate the tensions between small and large scale agriculture inherent in agricultural development. It will focus on how these six debates have arisen in the emerging biofuel sector.

2.0 The Great Biofuel Debate

Biofuels have been analysed from various disciplines and perspectives from energy and environmental sciences to economics, social and political science and agricultural ethics. Participants in the biofuels debate have come from many sectors including the energy industry, global environmental and farm movements, large capital funds, multilateral donors and science and technology lobbying bodies (von Braun, 2008). In terms of benefits, biofuel literature has focused on the potential for reducing dependence on fossil fuels and providing developing countries access to lucrative markets. In recent years, more critical examinations of biofuels have emerged focusing on environmental and ecological concerns such as the impact of biofuel expansion on deforestation and the extent to which production of bioenergy dumps more carbon in the atmosphere than it saves from substituting for fossil fuels. Debates have also surfaced over the possible competition between biofuel production and food production, which is threatening food security for burgeoning populations.

Discussions of biofuels and rural development in mainstream policy circles typically focus on the potential for smallholders to benefit from diversified markets. Success of biofuel production is predicated on the assumption that expanded agricultural production and integration in new markets through diversification into new crops will provide income for small producers (see Clancy, 2008; Peskett et al., 2007; van Braun, 2008).

Critiques of biofuel expansion are heterogeneous. Marxist critiques maintain that biofuel production is simply another model of capitalist agrarian monoculture production, which by its very nature precludes the participation of small scale producers on any significant scale. Due to the structure of capitalist markets, which inherently marginalise small-scale producers, even attempts to regulate production both at the national and international level to allow for small scale involvement will largely be unsuccessful in this view.

Adopting a more neostructuralist perspective, it is argued that increased support must be provided to national governments and at the international level to develop mechanisms to regulate the industry. Some of the proposed areas of regulation or reform include: monitoring of land for biofuel production; creating standards to certify land for biofuel production that respect prior ownership or users of the land and clear delineation of idle or unused land; and promoting investment in alternatives to large scale plantations (Cotula et al., 2008a: 3-4).

Multilateral and bilateral donors and inter-governmental organisations, such as the Food and Agriculture Organisation (FAO), originally published reports and studies promoting the use of biofuels in developing countries, but enthusiasm has waned in

recent years. The biofuel literature is increasingly emphasizing the need for emerging biofuel programmes to take into consideration the impact of biofuel production on the environment, food security and rural development, and the necessity to perform a cost-benefit analysis in each country. Many studies focus on formulating biofuel policies that promote the more 'sustainable' production of biofuels on marginal or unused lands, the integration of smallholders into biofuel production and allowing the benefits of production to reach a larger sector of the population. These analyses generally fail to examine whether or not existing international market structures influence biofuel frameworks, policies and proposals to allow for the integration of smallholders. To examine the literature related to smallholders, their role in development and challenges they face in entering modern agricultural markets in the context of biofuel expansion, the discussion is centred on six key debates within agrarian debate.

2.1 Rural Poverty and Export-oriented Commercial Agriculture

Early development theory often relegated agriculture to the margins of development, considering it important only in subsidizing industrialization in other sectors. Development economists such as Kurt Mandelbaum argued that industrialisation would occur in 'backward areas' from transferring surplus labour from the rural sector to the industrial sector (Mandelbaum, 1945). Similarly, Arthur Lewis (1954), in his classic conception of the dual economy of the 'traditional' and 'modern' sectors, argued that industrialisation would occur by transferring surplus labour from the 'traditional' to the 'modern' sector. Labour in the modern sector would benefit from higher productivity and technology.

In contrast to early classical economists, other theorisations of development became increasingly critical of subordinating the role of agriculture in development. Some have argued that economic development could be compromised through viewing agriculture simply in the context of surplus extraction (Nicholls et al., 1964). Development theory written over the last few decades has focused more on the development of the agricultural sector in its own right. Many theorists maintain that resources have been under-allocated to agriculture as a result of an urban bias displayed by both development theorists and policy makers (see, for example, Lipton, 1977, 1993).

The nature and role of agriculture in development has been explored through analysis of the impact of agriculture on both economic growth and poverty reduction. Development theorists and international development organisations have inextricably linked agricultural growth to declining rural poverty rates for decades (Binswanger and von Braun, 1991; Timmer, 1992; 1995; 2003; Bell and Rich, 1994; Johnson, 1998; Mellor, 1999; Ravallion and Datt, 1999; Hammer and Nashchold, 2000; Thirtle et al., 2001).

A key premise of agricultural growth theories is that integration into agricultural commodity markets will offer impoverished rural producers opportunities for increased income and employment. This premise is the basis for the view or belief that an agricultural development model based on industrialisation and large-scale monocropping agriculture will inherently benefit the rural poor in developing countries. This is to be achieved through using technology to improve agricultural yields, privatising, and liberalising the agricultural sector to attract foreign and domestic investment and promoting integration in high value agricultural markets. Failures are blamed on

structural limitations within agricultural production systems, institutions and infrastructure, not on the model of agricultural development itself.

Agricultural growth has become synonymous with the promotion of agricultural export crops. The debate over the viability of agricultural export promotion as a development model focuses largely on its impact on the rural poor. The landscape of views is broad. An economist perspective argues that expanding agricultural export production increases the incomes of farmers (Lewis, 1970; Schiff and Valdes, 1992; Myint, 1958; Diaz-Alejandro, 1975), among whom many will invariably be poor.

In direct contrast, development analysts writing from a Marxist perspective, (Lenin, 1966; Frank, 1969) and then later dependency thinkers from Latin America (Sunkel, 1969), argue that interactions between the core and peripheral countries in international markets have been created to benefit the former to the detriment of the latter, thus continuing to prolong the relationship established between these countries under colonial rule in the post-colonial era (Berry, 2001). Emmanuel (1972) contends that in international markets, 'unequal exchange' occurs whereby the industrial countries accrue the most benefits from trade with developing countries, which are forced to rely on the export of primary products. Agro-export monocropping is characterised as a mechanism to worsen existing disparities but not necessarily as the initial cause of the misdistribution of wealth (see Maxwell and Fernando, 1989).

Other critics of agricultural export promotion question the scope and duration of economic benefits associated with expansion of production, stressing that the most negative effects of agro-exports accrue to the rural poor (Conroy et al., 1994; Stanley, 1994; Stonich, 1991). This is evident by the fact that the number of households not able

to make minimum nutritional requirements is rapidly expanding even as agricultural exports have increased (Krznaric, 2006; Green et al., 2004).

Other theorists neither promote agro-export production as a panacea for rural development nor condemn export promotion strategies for exacerbating dependence on a global market dominated by developed countries. Carter et al. (1996) contend that agro-export expansion does not provide uniform development outcomes – neither universally excluding the rural poor nor universally eradicating rural poverty in developing countries. The impact of agricultural export production depends on the underlying microeconomics associated within each distinct socioeconomic context (Carter et al., 1996). As microeconomics can be shaped by government policy, agro-export booms can therefore be shaped to be more inclusive for poor rural producers (Carter et al., 1996).

Agricultural commodity markets have been characterised by stagnant or falling prices, price volatility, oversupply, short-term booms and long slumps. Farmers dependent upon the production of agricultural commodities have been faced with a decline in prices, with particularly steep declines in the second half of the 1990s. Countries producing only one or two main agricultural exports were particularly vulnerable and hardest hit when commodity markets collapsed.

With the sharp decline of those agricultural commodities labelled as traditional, attention has shifted to higher value agricultural products, which for the purposes of this study will be referred to as non-traditional agricultural exports (NTAEs). Adopting a neo-liberal policy analysis, development theorists propose that developing countries continue to export agricultural products but diversify away from traditional commodities (Humphrey, 2004). Proponents admit that shifting from traditional export crops or

subsistence agriculture to non-traditional exports does carry additional risks for smaller producers. These crops are generally not only more labour-intensive, but more input-intensive than traditional field crops and typically require more 'postharvest handling.' Profitability also depends on adherence to freshness and quality standards. While the price for these products is typically higher, farmers are required to risk more capital, learn new skills and 'work harder' (Benziger, 1996: 1981).

In recent years, biofuels have been considered the next high value crop expected to expand in market size and generate higher returns than traditional agricultural commodities. The emerging biofuel discourse has generated discussion over whether there is a necessity to create new ways of evaluating biofuel production, or instead draw on concepts and formulations used to understand other forms of capitalist monocrop production. The expansion of trade in biofuels has, some argue, reinforced existing patterns of trade in the international political economy and can only be fully understood in the context of the dynamics operating in other agricultural sectors (White and Dasgupta, 2010). Biofuels, however, intersect the fuel and agricultural markets, thereby differentiating the biofuel debate from that of other agricultural commodities.

To some proponents of biofuels production, biocrops provide environmental benefits not associated with other agricultural commodities. For some critics, biofuels reinforce unequal patterns of exchange between developed and developing countries that mirror the dynamics associated with other export commodities, while other critics go further to assert that biofuel expansion represents a new form of exploitation whereby biofuel production provides further opportunities for capital to consolidate control over new resources. Some critics argue that not only are biofuel crops likely to be much more

highly regulated than other agricultural commodities, government consumption targets are creating an artificial demand that is unprecedented among cash crops and which is likely to persist beyond the usual length of a 'commodity boom' cycle (Cotula, Dyer and Vermeulen, 2008a).

With energy markets larger than food markets, biofuels are considered to offer unparalleled opportunities for the poor to benefit on a large scale. Emerging from the neoliberal premise that integration in world markets will generate economic development and thereby reduce poverty, developed country demand for biofuels represents a seemingly attractive new opportunity for rural producers in developing countries to gain employment and higher incomes and improve food security (Coelho, 2005, de Keyser and Hongo, 2005; Peskett et al., 2007).

According to its proponents, biofuels have the ability to meet domestic energy demands (Raswant et al., 2008: 7). Biofuel expansion will, therefore, allow developing country producers to become less dependent on developed countries by allowing them to reduce their oil import dependency and yield higher export revenues while permitting them to invest their capital in their own farms and industries (van Eijck and Romijn, 2006, ICRISAT, 2007). Others see biofuel production as inherently being promoted for export markets, thus making African countries even more commodity dependent.

The feedstocks of biofuels tend to be land-intensive, low value crops, therefore providing generally low rates of return from the crop. Profits are generated in controlling the value addition associated with the industry: the conversion of crops to fuel (White and Dasgupta, 2010). Therefore, local communities are unlikely to benefit from biofuels expansion, as they do not have the capacity to process biofuels and are unlikely to

develop such capacity as the industry grows. Others contend that first-generation feedstocks (such as oil palm, sugarcane and Jatropha) are inefficient and will likely be replaced by other technologies within a decade or two (Ernsting, 2007).

Biofuel expansion is not driven by rural development concerns, according to some critics, but an agro-export model is being promoted to which present more threats than opportunities for poor rural regions of the developing world (Oxfam, 2007; Bailey, 2009). In this view, the structure and nature of non-traditional export markets prevent the inclusion of smaller producers as they require further infrastructural development and training and the cost is often too much for smaller producers to bear. Export-oriented development by its very nature supports the expansion of large scale production systems, generating widespread debate over the ability of small scale agriculture to persist in the face of modern capitalist agriculture. This illuminates another key debate within agricultural development – the debate over small versus large scale production.

2.2 Small versus Large Scale Farming

At the centre of the discussion over small versus large scale production is the debate over the ability of peasant production to be sustained in global capitalist systems. Peasant economy theory is dominated by two classic writers. Lenin argued that the differentiation of the peasantry and other petty commodity producers was fundamental to the development of capitalism. Chayanov contested the notion of class differentiation of the peasantry arguing that the peasant economy "excludes the capitalist imperative of accumulation" (Bernstein, 2009: 61).

Many scholars have increasingly discussed the fate of the peasantry amidst increasing internationalization, concentration and centralisation of capital, and establishment of "state forms, economic systems and labour regimes" that have subordinated peasants (Akram-Lodhi and Kay, 2010: 177). Hobsbawm even declared the death of the peasantry as a social class (1994: 289). Yet, many agrarian scholars have refuted the notion that there is no future for peasant producers within a globalised capitalist system (Bryceson et al., 2000, Watts, 2002, McMichael, 2006; Johnson, 2004). Bernstein describes contemporary peasants as 'petty commodity producers' who, although operating as petty capitalist, are workers with limited control over their terms of employment (Bernstein, 1991, Gibbon and Neocosmos, 1985). Akram-Lodhi and Kay similarly contend that although 'small scale petty commodity production' still has a role in agricultural systems in an era of neoliberal globalisation, the role has been much reduced, with many "rendered redundant to the needs of capital (2010: 180)."

The ability of the peasant or small commodity producer to survive in the modern capitalist agricultural system has been linked to the level of productivity of the smallholder in comparison to large, more capital intensive agriculture. Theorists have debated the existence of an inverse relationship between yield and size, whereby as the farm size gets larger yield per acre decreases. Neo-populist Marxists, have argued that family labour farms applied more labour per acre compared to 'capitalist farms', thus obtaining a higher yield per acre. Economically, small farms support efficiency through using family labour, which lowers supervision and transaction costs and the 'factors endowments' of poor countries: surplus labour and scarce capital (Bernstein, 2009).

Small farms also support equity, in this view, through the employment outcomes and income distribution.

Both Lenin (1966) and Kautsky (1899) argued that the larger the size of the farm the more production required to cover costs and garner a certain level of income (Akram-Lodhi and Kay, 2010). Kautsky further claimed that smallholders cultivating crops on an intensive basis "can constitute a larger enterprise than a bigger farm that is exploited extensively" (Banaji, 1980, 75). They did not argue that smaller sized farmers were more profitable but that peasant farmers on small plots of land would be forced to work harder in order to survive (Akram-Lodhi and Kay, 2010).

More recently, scholars have made the case that small farms are inherently more productive and can be dynamic, innovative, and at times, more productive than large farms with few workers, low wages and limited productivity (Sulle and Nelson, 2009). Lipton argues that efficient, small scale, labour-intensive farming can be more competitive than more intensive, mechanized farm systems using low-paid labour (1986).

Conversely, mainstream economists have predicted the demise of the small, family farm. Labelled as backward, unproductive and inefficient, they have been considered an obstacle to economic development (Rosset, 1999). The prevailing view for decades has held that smallholder pastoralists and farmers are inefficient and do not make sufficient contributions to rural development. According to a neoclassical approach, many have argued that the era of the small farm is over and small farms should be consolidated into fewer, larger landholdings, thereby allowing for the use of economies of scale and increased mechanization. It is purported that with limited potential to adopt new technologies, generate surpluses or access world markets, investment in small scale

farming should be abandoned in favour of large scale production which is able to generate more profits and employ a greater segment of the rural population.

Others suggest that the success of the operation, whether small or large scale, differs in each case depending on the type of crop, the policy context and the amount of support provided (Vermeulen and Goad, 2006; Cotula et al., 2008a). Small farms are generally family run and labour intensive but can be either subsistence or market-based, can use few or many external inputs and can use machinery or solely manual labour. Though generally market-oriented, large farms can be family run or corporate and use few or many labourers and can rely on management firms to run the operation. De Janvry et al. (2001) argue that some crops favour more labour intensive production and that is better suited to small scale production while other crops are better suited to more mechanized, less labour-intensive cultivation, thereby better suited to large scale.

As biofuel production has expanded to developing countries, the debate over small versus large scale production has intensified. Dominating the debate over the type of production/crop most conducive to generating profit from bioenergy markets is the discussion over the extent to which crops should be widely produced on a large or small scale. Large scale production is deemed to offer benefits to the rural poor in the form of employment, skills development and secondary industry while taking advantage of economies of scale. Further, some maintain that ever expanding large scale biofuel production provides opportunities for economic growth through a model that includes both import substitution (of fossil fuels) and export growth (of biomass/biofuels) (Mol, 2007: 305). Small scale production provides poor producers with both increased yield

and incomes, securing long-term poverty reduction in countries dependent on a few agricultural commodities (Cortula et al., 2008a).

Current global investment in biofuels has been dominated by large investors such as agribusiness, petroleum companies, private banks, private foundations and large scale producers. This has increasingly generated criticism over the implications of continuing large scale production controlled by a few investors. Critics argue that biodiesel and bioethanol production, by its very nature, excludes participation of small scale producers, and instead propose that domestic fuel needs can be more sustainably met through other alternative energy sources such as methane or vegetable oils. Even the FAO has recently concluded that biofuel expansion favours large scale enterprises, thereby presenting a concern for small scale producers:

> ...production of feedstock for biofuels is by its very nature best suited for large holdings, and it is to an extreme degree a monoculture production, with all its negative implications. It opens up [opportunities] for foreign and outside investors on an unprecedented scale (Eide, 2008: 17).

The expansion of bioenergy programmes, in this way, could concentrate already highly asymmetrical land holdings into the hands of a few export-oriented landholders with capital resources sufficient to absorb the risk of production, thereby limiting the opportunities for smaller farmers with limited financial resources (Fritsche et al., 2006; Mongayama, 2009).

As concern over expansion of large scale biofuel plantations has grown, the promotion of small farmers in biofuel markets has become more widely regarded as

being beneficial to a larger percentage of the rural population. This is fostering broader support for economic growth, trade expansion, technological adoption and improved welfare. Production and processing of bioenergy by smallholders is promoted to empower farmers to produce energy, take advantage of new domestic and international markets and generate new or increased incomes, thereby contributing to rural economic development (Ejigu, 2008).

The debate over the ability of biofuel crops to generate employment and income for smaller producers over a sustained period of time resembles past debates over other cash crops. Within neoliberal theorisation, the inability of smallholders to participate in biofuel markets is not a result of market imbalances or policies/strategies that promote large scale production, but is instead related to 'inefficient' markets in developing countries.

Proponents of small scale expansion argue that low-input biofuels like Jatropha can happen on marginal lands, thereby contributing to local soil improvements and providing farm income through simple cultivation techniques (von Braun, 2008). However, these small scale local biofuel regions have been characterised as inefficient when factoring in energy balances and cost structures (van Eijck and Romijn, 2006) and are only appealing in more peripheral areas not currently served by conventional fossil-fuel infrastructure (Mol, 2007). This has resulted in the expansion of national biofuel regions characterised by large scale monocropping with homogenised production and refining, to the detriment of local biofuel regions (Mol, 2007). Profits from the industry are generally not in field production but come from the control of value-added processing in the conversion and production stages of the biocrops (White and Dasgupta, 2010).

Critics refute the claim that crops such as Jatropha are the new miracle crops for smaller producers, and contend that even those crops are controlled by large transnational corporations, which have taken over scarce land that is required for food production. Further, it is purported that these crops have failed to meet expectations, requiring too much water and yielding too little. (Ribeiro and Matavel, 2009, FOE, 2009). Rather than create an opportunity for smaller producers to profit from lucrative markets, opponents argue that the biofuels revolution, as it has been called, is geared towards replacing local agricultural systems with large plantations, serving to extract wealth from rural communities rather than to generate local resources (see for example Holt-Giménez and Shattuck, 2007). Bioenergy crops, due to the agricultural risks and expense associated with their production, may increasingly concentrate lands among few commercial producers with extensive financial resources and the ability to withstand risks (Fritsche et al., 2006). The debate continues over large scale, industrial agricultural promoting monocropping for fuel versus a small scale model promoting more agroecological models of production involving multi-cropping for food.

2.3 Industrial Agriculture/Monocropping versus Agroecology/Multi-cropping

The debate over industrial agriculture and the promotion of monocropping versus agro-ecological views of agricultural development promoting multi-cropping is situated within the context of larger debates over the nature of the food system. With the advent of the Green Revolution initiatives, occurring between the mid 1940s and late 1970s, industrialised agricultural production grew in developing countries through the expansion of high-yielding varieties of cereals grains, the intensive use of fertilisers and pesticides,

the expansion of irrigation infrastructure, and the distribution of hybrid seeds. Proponents of Green Revolution technologies promoted monocultural agricultural development, increasing the productivity of key commodities, generally to promote export expansion. Although this was deemed a success for increasing yields of some cereal crops, critics vehemently label the Green Revolution a failure for promoting expansion of unsustainable monocultural agricultural systems based on large scale producers as well as, in many cases, generating soil, pest and weed problems and even leading to decline in yield over the long-term (Altieri et al., 1998). A new wave of agricultural intensification based on increased fertilisation and pesticides using bioengineered crops, similar to the initial Green Revolution, has expanded throughout developing countries, particularly in Africa and Latin America. This has generated renewed criticism over the unsustainability of the monocultural, agriculturally intensive model of development it promotes.

In contrast to the agro-industrial monocultural model of agricultural production is an environmental approach favoured by increasing numbers of farmers, NGOs and agrarian analysts around the world that promotes an alternative path of agricultural productivity relying on local knowledge and inputs emerging from fields of sustainable agriculture, agroecology, environmental economics and political ecology.

From the sustainable agriculture perspective, theorists such as Pretty (2007) maintain that although agricultural productivity has increased over the past 50 years, production has been strongly driven by increased use of fertilisers, water and agricultural machinery and use of external inputs in order to increase production levels. Pretty calls for the development of new approaches that integrate ecological and biological processes into the production of food in order to minimize external inputs in production that have

caused irreparable damage to the environment and to the health of farmers and consumers (Pretty, 2008). Ecologically managing food systems would require using the collective knowledge and skills of farmers to solve agricultural and resource problems over external, and often, environmentally damaging inputs (Pretty, 2008). In this way, sustainable agriculture is seen as a rejection of uniformly applied machinery, technology and highly intensive monocropping in place of technologies, practices and policies to suit each particular place. According to Pimbert et al. (2001), the current globalised and industrialised food system is not benefiting the majority of smallholders in the South or family farmers in the North. Only a small group of farmers, multinational input suppliers, retailers, food producers, distributors, retailers and some consumers are reaping the rewards of the push towards monocultural production to the detriment of local environments and people (Pimbert et al., 2001).

Similarly, agroecological discussions on food systems focus on local knowledge and inputs rather than external technology and inputs. Agroecology is regarded as agriculture that takes into account environmental and social aspects in production and the overall sustainability of the production system. Modern agroecology developed in the 1970s with its practice dating back to the origins of agriculture and the incorporation of mechanisms to accommodate crops to the natural environment and protect them from competition (Altieri, 1995). The concept recognizes that traditional farming practices are not the panacea for agricultural problems in the world, but can provide insights into sustainable crop, water and soil management (Altieri, 1995). It integrates traditional knowledge with modern technical knowledge to "arrive at environmentally and socially sensitive approaches to agriculture, encompassing not only production goals but also

social equity and ecological sustainability of the system" (Altieri et al., 1998). Agroecologists acknowledge that peasant agriculture does not have the potential to produce the same marketable surpluses as industrial agriculture. Cropping techniques can, however, contribute to food security in many ways and produce greater yields per area in an integrated ecological system featuring many types of crops together with trees and animals (Altieri, 2000).

Situated within this debate over old versus new forms of agricultural knowledge is the debate over biofuel production. The expansion of biofuels has intensified the debate between industrial agriculture/monocultural production systems and agroecology/multi-cropping production systems. The recent food crisis, precipitated by an upward trend in food prices between 2004 and 2008, brought to light the tensions between promotion of multi-cropping for food in developing countries and non-food monocropping to serve developed country markets. According to Holt-Giménez and Peabody (2008), the world food crisis reflects the weaknesses of the current food system, which has been particularly vulnerable to environmental and economic shocks arising from risks and inequalities in the industrial agri-food complex. Throughout a half-century of erosion of agricultural systems and promotion of monocrops for export, many developing economies witnessed the value of their yearly food surplus decline from approximately $7 billion US to $1 billion US within the span of 40 years (FAO, 2004).

Many theorists, policy makers, activists and researchers agree that biocrops should not interfere with food production and its access chains (Hill et al., 2006; Fritsche et al., 2006; Mangoyana, 2007), but widespread debate is occurring over the extent to which varying biofuel crops and modes of production affect food security. The impact of

biofuel production on food prices is highly contested as it is difficult to disaggregate the price impact of biocrops from other factors such as shifting consumption patterns, fuel prices, reduced global stock, supply constraints in remote rural areas or production shocks due to things such as global environmental change (Peskett et al., 2007; Cotula et al., 2008a: 13; Bailey, 2008: 19). Even proponents of biofuel production admit that the shift towards biocrops has, at least in part, contributed to the rise in food crops (Ewing and Msangi, 2008; World Bank, 2008; FAO, 2008b; Doornbosch and Steenblick, 2007). It has particularly affected developing countries that are net importers and large consumers of cereal grains (Kojima et al., 2007). The main feedstocks currently being grown for bioenergy appear at the top of the list of food that contributes to global calorie consumption. Maize, sugarcane, cassava, palm oil, soy and sorghum comprise about 30 per cent of the mean calorie consumption of the poor (Naylor et al., 2007: 41).

Some argue that biofuels not only consume food crops directly, which drives up the price, but competition for land, water and other inputs also contributes to the rise in food crops (Bailey, 2008: 19-20). The International Food Policy Research Institute (IFPRI) further argues that support for biofuels, which creates incentives for producers to divert resources away from food production and into fuel production, acts as a tax on food, which significantly affects the poor (von Braun, 2007).

The potential negative impacts of bioenergy crops on food supply can, Mangoyana (2007) argues, be compounded in regions more affected by the adverse impacts of climate change and with limited capacity to adapt to climate change. In areas experiencing declining agricultural productivity due to unsustainable agricultural and

forestry practices in the past, production of bioenergy is more controversial and thought to have more of an impact on local food supplies (Mangoyana, 2007: 3).

Biofuel sceptics surmise that heavy reliance on biofuel production may make it impossible to guarantee food security in a world where competition for scarce arable land and water is already fierce (Giampietro, Ulgiati and Pimentel, 1997). However, others are confident that biofuels need not compete with and drive out food production. Energy crop production can best be harnessed to assist rural communities in attaining new, more affordable and renewable energy supplies and guarantee food supply by ensuring a mix of crops are planted, rather than focusing entirely on monocultural production. In some countries, food crops have been grown in rotation with energy crops. For instance, in Brazil, farmers increasingly grow sugarcane in rotation with food crops such as tomatoes, soya and peanuts (von Braun and Pachauri, 2006).

Biofuel advocates maintain that a 'food-versus-fuel' scenario only arises in areas where technological innovation and investments are rare or absent (Msangi and Rosegrant, 2007: 710). However, in a 2006 report, the Organisation for Economic Cooperation and Development (OECD) contends that bioenergy cropping competes with food production right from the beginning (OECD, 2006). The OECD report argues that this increase would amount to 3.8 percent of all the arable land in the world allotted for biofuel production, appearing on a global scale to be rather small, but having a significant impact at the regional level (OECD, 2006: 33-34).

The tension between an industrial model of agriculture and an agro-ecological model generates a discussion over who benefits from varying models of production. Industrial, monocropped agriculture has provided large profits for transnational

corporations, which are playing an ever-expanding role in agricultural systems in developing countries and compromising the ability of rural households to garner an income from agriculture production.

2.4 Rural Poor Households' Subsistence versus Transnational Companies' Profits

Determining the role that agricultural transnational corporations (TNCs) or agribusinesses play in the current food system is crucial to understanding the inherent tensions between local subsistence and agribusiness profit. The expansion of agribusiness into developing countries has generated contrasting analyses.

There are those parties that believe small farmers have much to gain from agribusiness and are necessary to development of agriculture in the Least Developed Countries (LDCs) (Goldberg, 1981). In the 1960s and 1970s, TNC involvement in developing countries was promoted to stimulate agricultural productivity through providing access to profitable markets in the West and technological improvements. Profits expatriated by the companies were considered necessary for reviving the agricultural sector, which would provide benefits domestically (Golberg, 1981; Lipton, 1977).

Increasingly, as TNCs have solidified control of the agri-food system in developing countries, more critical analyses have arisen linking increased transnational control over food systems with deepening impoverishment and de-agrarianisation of smallholders. Critics of TNC expansion in developing countries have argued that they exacerbate inequality, dependency and poverty. Through promoting export crops over production to serve domestic needs, production systems have become less self-reliant,

favouring large, capital intensive projects requiring imported inputs (George, 1977; Lappé and Collins, 1977; Dinham and Hines, 1983). Pimbert (2001) makes the case that small and marginal producers within local food systems with limited access to credit and markets have little power over production decisions as transnational corporations exercise great decision making authority, and are largely held unaccountable on a national or international level.

Other parties acknowledge that TNCs have reinforced rural inequality and reduced local producer independence, with benefits distributed unevenly (Goldsmith, 1985), but argue that the introduction of modern technology has in the African agricultural context helped to raise productivity levels to increase domestic food supplies and enable access to Western markets (Halfani and Barker, 1984).

Arguing that developing countries have been the target of corporate investments from the "outset of the industrial food system", Wilkinson (2009) contends that global capital has subjugated local food systems and markets within developing countries. In the absence of strong political and economic institutions in developing countries to direct and control technological innovation and industrialization, TNCs have been able to operate with limited regulation gain a firm hold in developing countries (Jacoby, 1975: 91-92).

Acknowledging the risk that excessive TNC control of agriculture can have on the food system, various farming arrangements have been promoted by governments and development agencies in order to allow impoverished producers to engage in profitable agricultural operations. Contract farming has been promoted as a mechanism to facilitate small farmer access to credit, technical assistance and inputs in markets with high

standards and costs (Minot, 1986) and has been proposed by both proponents and opponents of agricultural liberalisation and corporatization (Glover, 1987; Singh, 2002).

Production contracting establishes an agreement between the processor and grower in which the processor commits to buying a given amount of output from the grower, the details of which vary according to each contract (Scott, 1984). The contract arrangement is usually contingent on the grower using specified inputs, perhaps even at specified times, with the processor often providing the required inputs and production advice. Contracts also vary based on the type of payment scheme and the precise allocation of risks and benefits between the processor and grower (Scott, 1984).

A vigorous debate has emerged over whether contract arrangements will benefit farmers or benefit transnational corporations to the detriment of small farmers, compromising their ability to meet household income needs (eg. Dirven, 1996; Glover, 1987; Glover and Kusterer, 1990; Singh, 2002, Little and Watts, 1994; Porter and Phillips-Howard, 1997; Key and Runsten, 1999; Eaton and Shepard, 2001). Some maintain that contractual arrangements give smallholders the ability to participate in high value markets they would otherwise be excluded from. According to Buch-Hansen and Marcussen (1982), criticism of contractual agribusiness-farmer arrangements originated from dependency theorists arguing that capitalist agriculture would only further immiserate the rural poor, arguing that agribusiness leads to proletarianisiation of small farmers with benefits accruing only to middle income and rich farmers.

The evidence suggests that the partnership of smallholders and agribusiness has not been a profitable one for marginalised farmers, binding them to contracts with favourable terms for multinationals and linking them to volatile global markets. This

model of production, although presented as a method of increasing incomes and providing jobs for poor producers, has in fact allowed agribusiness to uproot local production and producers. Contract farming and its variants (outgrower schemes, nucleus estates, satellite farming) have come under increased criticism, given that they are yielding some successes but more failures (Little and Watts, 1994; Jaffee, 1994; Runsten and Key, 1996, Glover, 1987, 1990; Glover and Kusterer, 1990; Porter and Phillips-Howard, 1997; Eaton and Shepherd, 2001).

Biofuel production has similarly generated discussion over the ability of smallholders to benefit from markets inherently controlled by TNCs. Although biofuel production is often presented as a pro-poor policy, critics contend, it actually represents the greatest opportunity for the world's food processing and oil companies such as Archer Daniels Midland (ADM), Bunge and Cargill to expand and increase profits (GRAIN, 2007). Opponents suggest that of all those participating in the biofuel economy, it is agribusiness that benefits inequitably and is most assured to profit from mechanized harvesting and production chains. Critics also surmise that large scale distributors will also be responsible for supplying much of the refined fuels as well. The development of new technologies to convert biofuel crops will also be monopolized by those with larger pools of financial capital, thereby further increasing the advantages reaped by agribusiness in these markets.

Some studies on biofuel production, while acknowledging the risks posed to small farmers and the rural poor avow that smallholders can be, and have in some cases, integrated into biofuel production. As with other agricultural commodities, contract farming has been promoted to allow smallholders to take advantage of agricultural

market opportunities. Mainstream development organizations and agricultural research institutions argue that contract farming schemes offer both price stability and technical support for farmers "but have the disadvantage of locking both sides into arrangements that may be perceived as less fair and advantageous as market conditions progress over time (Cotula et al., 2008: 36)." Others argue that, like with other agricultural commodities, small farmers engaged in supplying companies the raw material for the production of biofuels are generally disadvantaged in their contracts and lack legal recourse should companies fail to adhere to contractual arrangements.

As transnational companies have accumulated land and resources in rural areas of developing countries, the ability of small scale producers to retain access to their lands has been compromised, leading to dispossession in some cases and incorporation into large scale farming schemes through low paid employment in others. This illuminates another tension inherent in agrarian development, between small scale production which allows the rural poor to retain access to land and dispossession which takes smallholders from their land or incorporates them into large scale production systems, disadvantageous to the rural poor.

2.5 Small Scale Farming with Land Access versus Dispossession/Adverse Incorporation

Classical political economists and later Marxists were concerned with the concept of previous accumulation or primitive accumulation or original accumulation of capital, which is the process by which pre-capitalist or feudal modes of production were transformed in a capitalist mode of production. That is, how a small percentage of the

population came into possession of the resources to employ people and make profit, resulting in a majority of the population having to subsist through wage labour. Adam Smith viewed the process of original accumulation as largely a peaceful process by which, through the increasing division of labour, individual producers became specialized at making goods which created a segment of the population that became merchants, selling those goods while others became factory owners, employing others as wage workers. In this conception, those who accumulated more did so through work and saving.

Marx viewed primitive accumulation as a process through which large segments of the population are separated from their traditional means of survival. Marx's concept, unlike the peaceful tale described by classical political economists, was one where common lands were 'violently' closed to peasants using them, expelling the local population and in the process creating a landless proletariat:

> In the history of primitive accumulation, all revolutions are epoch-making that act as levers for the capital class in course of formation; but, above all, those moments when great masses of men are suddenly and forcibly torn from their means of subsistence, and hurled as free and "unattached" proletarians on the labour-market. The expropriation of the agricultural producer, of the peasant, from the soil, is the basis of the whole process. (Capital, Volume 1, Chapter 26, Marx, 1906).

David Harvey (2005) expands this conception of primitive accumulation to refer to 'accumulation by dispossession,' which he views as a continuing process within the

global process of capital accumulation. A politically driven process, occurring simultaneously alongside capital accumulation, the concept defines the neoliberal changes that have occurred within western countries from the 1970s to the present, guided by the practices of privatisation, financialisation, management and manipulation of crises and state redistribution (Harvey, 2005). Harvey (2005) describes a predatory and sometimes violent process by which multinational capital, supported by capitalist states, have dispossessed people of their land and livelihoods in order to expand their role and influence. Referring to Marx's notion of crisis through 'over-accumulation' Harvey argues that accumulation by dispossession can act as a partial solution – as a result of dispossession, raw materials are available at a cheaper rate, allowing consumer commodities to be available at lower prices allowing for greater consumption and the increase, at least temporarily, of the profit rate.

According to this view, through the appropriation and marketisation of 'hirtherto uncommodified realms' companies have expanded their control over regions of the developing world. Small farmers have been displaced or forced out of the sector, or incorporated into commercial farming either through employment or contract farming schemes. To serve Western demand, developing country farmers have been pushed off their land, to produce traditional agricultural commodities as well as an increasing number of non-traditional agricultural exports. Rising fuel prices, as a result of depleting stocks, have spurred developed countries to seek out alternative sources of fuel. The recent boom in land accumulation by foreign investors in developing countries seeking out alternative energy sources has led many to forecast accumulation and adverse incorporation on a large scale.

This debate over biofuels has also increasingly touched on Malthusian debates over the capacity of the earth. Chaturvedi (2006) argues that population growth combined with increased demand for biofuels and food will stimulate competition over scarce land resources. Competing claims for resources among local inhabitants and incoming commercial biofuel interests have often led to the expansion of commercial biofuel production and rural poor losing access to the land on which they rely for their livelihood (Cotula et al., 2008b). In developing countries plagued by weak land tenure systems, large private entities that are typically from outside the country may appropriate land from poor producers at low prices (Raswant et al., 2008: 6).

While issues of land access have been debated through the expansion of other cash crops, biofuel expansion has sparked debate that it is beginning to generate more pressures on land tenure due to the speed at which the expansion may occur (Peskett et al., 2007), particularly affecting the lives of the poor whose livelihoods depend on the land, livestock and forests (Mol, 2007). Oxfam argues that a side effect of setting high biofuel targets is the 'scramble to supply' in which the richest most powerful investors or companies rush to buy new land, potentially displacing the most vulnerable communities or producers whose right to the land is poorly protected. Where land tenure is not secure and land is held through custom, rather than law, the likelihood that the poor will be forced off their land has risen and will increase competition not only for land but also for water (eg. Eide, 2008).

The ability of the poor to obtain and retain access to land varies under different biofuel scenarios. Current land arrangements for sugarcane in Brazil, for example, have continued to reduce access to land for poor people, which is a reflection of the historical

arrangements from the expansion of the crop during the 19th and 20th centuries. This is in contrast to palm oil production in South East Asia, where Peskett et al. Suggest (2007) that biofuel production has actually made improvements in land administration in some cases. The impact of biofuel production on land access for the poor is also dependent on whether the crop is annual or perennial, whether the crop can be grown in combination with other crops and whether the crop can be produced on degraded, discarded or unused land or used to revitalize degraded soils (Peskett et al., 2007).

The issue of land tenure, land rights and land laws figures prominently in the biofuel debate. In Africa, a high degree of uncertainty and insecurity exists in relation to land tenure, which is a consequence of the colonial legacy where land ownership was highly centralised (Alden Wily, 2008). The effect of biofuel production on access to land is, therefore, also determined by the legal framework related to acquiring land in each socioeconomic context (Cotula, Vermeulen et al., 2009). Despite attempts to clearly delineate the procedures required to acquire land, land acquisition still tends to be complicated, unclear and unpublicised, thereby limiting the ability of governments to ensure that land used for biofuel plantations will not compromise the ability of the rural poor to keep and access land.

The ambiguity of land laws and absence of clear regulations and guidelines has led to serious conflicts over land use in some instances between biofuel investors and local users which have been difficult to resolve (Cotula, Vermeulen et al., 2009). Biofuel critics suggest that despite the fact that many national governments pursuing biofuel expansion maintain that production will not compromise local users' rights to the land,

governments have continued to allot lands for large scale investment, fuelled by economic interests (Sulle and Nelson, 2009).

Critics contend that the biofuel industry will rely on land grabs, land tenure reform and agrarian transformation to make land accessible for growing crops. Appropriation of land, forced evictions and human rights violations to make way for biofuel plantation development have emerged in different parts of the developing world. In some cases, agribusinesses have urged farmers to sell their land. In situations where land titles do not exist or are not recognized, companies have appropriated land without informing the communities who have used the land for generations (Eide, 2008). This has resulted in widespread debate over competing notions of land and ownership, and discussions about how categorizations of land fail to take into account the social relations of land and how it affects rural communities.

2.6 Competing Meanings about Land and Notions of Idle, Under-utilized and Marginal Lands

To codify land use and land property relations, the state, in what Scott (1998) refers to as 'state simplification', created categories of land use and land property to allow for central administration of lands and landholders. Locally based practices of measuring land were 'illegible' to the state in their original form, according to Scott:

> They exhibited a diversity and intricacy that reflected a great variety of purely local, not state, interests. That is to say, they could not be assimilated into an administrative grid without either being transformed or reduced to a convenient, if partly fictional, shorthand (Scott, 1998: 24).

Notions of land use have been simplified within many developing countries' land policies; such categorizations generally fail to take into account historic social relations governing land use. Given that large tracts of land are still under 'customary' land holding, various classifications of land, ambiguous laws and procedures governing land transactions and unclear land property rights exist. Mainstream development organisations have generally promoted the adoption of private property rights in order to allow for the 'efficient' management of lands through formulating land titles and land demarcations to clarify land ownership and avoid the complications that arise through 'land-based social relations' (Borras and Franco, 2010).

This process of simplification has created the "key operational mechanisms through which land use change are facilitated (or not)" (Borras and Franco, 2010: 19) which have affected the recent phenomenon of large scale land transactions, particularly within the context of foreign acquisitions of land for fuel production. In recent years, the number of transnational land deals has expanded in the global South, with foreign and domestic investors increasingly seeking out land suitable for agriculture. The large scale investments ranging in the tens of thousands to hundreds of thousands of hectares have been generally for biofuels or outsourced food production (IFAD, 2009). As governments and investors in developed countries are increasingly looking to 'land rich' poor countries to supply their energy and food needs, debates have arisen over land, the nature of the land deals and the competing notions of idle and marginal land.

From the perspective of investors and governments in the countries of the West, acquiring land beyond one's borders either through long-lease or outright sale (depending on local land policies) will be necessary to meet future food and energy needs (Borras

and Franco, 2010). The current surge in commercial land transactions has been characterised as a 'global land grab' particularly by groups concerned about the dispossession of local communities through monocultural agricultural expansion in diverse ecosystems (Holt-Giménez, 2009).

With widespread alarm over the expansion of large tracts of land in developing countries, international organisations such as the IFPRI, the World Bank and the FAO have entered into the debate as to whether the transfer of land from local farmers to foreign investors is a development opportunity or a threat to local livelihoods. Analyses of 'land grabs' from these institutions, while acknowledging the danger that large scale land acquisitions can pose for local communities, assert that such deals can provide economic opportunities: "depending on the way they are structured, these investments can either create new opportunities to improve local living standards or further marginalise the poor (Cotula and Vermeulen, 2009)."

In a FAO/IIED report entitled *Land grab or development opportunity? Agricultural investment and international land deals in Africa*, the authors review trends in foreign land leases and purchases and examine the risks and benefits associated with such acquisitions in Africa (Cotula, et al., 2009). The report emphasizes the need for: (1) clarity of the costs and benefits of transactions; (2) adoption of clear principles for local level engagement; (3) use of short-term rather than long-term leases; (4) free, prior and informed consent to allow local populations to be more involved in land decisions; and (5) adoption of mechanisms to ensure transparency and accountability and to protect against purely speculative land transactions (Cotula et al., 2009). Arguing that foreign land investments "could be good news if the objectives of land purchasers are reconciled

with the investment needs of (hosting) countries" the FAO similarly makes reference to principles that should govern investor and recipient government land transactions (FAO, June 2009: 1).

Such a stance has generated widespread criticism from NGOs, researchers and independent exporters who deem the measures and principles presented by international organisations such as the FAO as ambiguous, oscillating between criticizing land deals for dispossessing local communities and praising them for the potential for rural development (Godoy, 2009). Borras and Franco (2010) further critique efforts by organisations such as the World Bank and IFPRI to promote a framework to harness the rural development potential of land investments while mitigating threats to local communities and the environment. The formulation of a 'code of conduct' (CoC) for transnational land transactions through bringing together 'multiple stakeholders', while "a worthy idea in principle", is not pro-poor in practice (Borras and Franco, 2010). The CoC fails to link the causes of poverty to TNC control of the global agri-food system and does not provide mechanisms or outcomes for protecting and advancing land access for the poor (Borras and Franco, 2010).

There is a widely held assumption that in many developing countries, particularly in regions of Africa, that there are large amounts of 'marginal,' 'idle,' 'wasted' and 'unused' lands. Attached to the concept of 'idle' or 'marginal' land is the notion that industrial agriculture can restore degraded land, use 'underutilized' lands to their full potential and 'reinvigorate idle land' (Borras and Franco, 2010). Proponents of biofuel production suggest that millions of hectares of such land is available in developing

countries and can be made more 'productive' by biofuel production in a way that does not compromise food production (Gopalakrishnan et al., 2008).

Another categorization of land that has caused confusion and conflict, while failing to acknowledge social ties to the land, is the term 'reserve agricultural land.' Estimates of such land typically are derived from official census data about land use and property relations, which are often contradictory, unreliable and outdated in many developing countries (Borras and Franco, 2010).

However, in recent years various academic, NGO, activist and media reports and policy studies have disputed this notion of unused land that could be made more 'productive' through biofuel production. Borras and Franco (2010) argue that categorizing land use as "reserve land' or 'marginal' relegates diverse land-based social relations and practices to the past, and deems them unnecessary to protect or recognize in the future. This will result in more dispossession for the purpose of transforming 'marginal' land into more economically productive land.

The much publicized Gallagher Review also critiques competing categorizations of land use, arguing that the lands that many are quick to label as marginal, wasteland or idle are in fact vital for the survival of the inhabitants of the land, which include small scale farmers, pastoralists, women, and indigenous people (Gallagher, 2008). These are often lands that have been under informal, customary land use arrangements for generations and have not been utilised for intensive agricultural production (Gaia Foundation, 2008).

The preceding debates reveal that mainstream development theorisation, adopts neoliberal concpetualisations of the inherent benefits of global commodity market

integration and commercialisation of small scale, under-resourced producers. Increasingly, this has generated widespread criticism. Despite promising a myriad of benefits for the rural poor, agricultural growth has generally promoted an exogenous development model which has entailed industrial, monocultural, export-led production systems dominated by transnational corporations. Emerging evidence suggests that biofuel production has followed this model of production, and has largely not proved beneficial to poor smallholders in developing countries.

Summary

This chapter elucidated the debates existent in agrarian development, revealing an inherent tension between two contrasting models of agricultural production – one that promotes small scale, multicropped agriculture, smallholder access to land and the ability of the rural poor to produce for their own subsistence, and one that favours large scale, industrial, export-oriented agriculture dominated by transnational and national capital. The discussion reveals that the biofuel debate in many way mirrors earlier discussions over agricultural development, with an increasing number of academics and researchers expressing concern over the recent expansion of biofuel initiatives in the global South. Proponents of biocrop production insist that the intersection of the energy and agricultural sectors provides additional opportunities for the rural poor to benefit from expanded agricultural markets whilst promising energy security for fuel dependent developed countries. Conversely, critics contend that this compromises the ability of the rural poor to meet food security needs, and provide for domestic markets through the promotion of export crops to serve biofuel demands in Western markets. Given that

smallholders have generally been marginalised in global agricultural markets as large companies have gained power and access to markets, the opportunities for smallholders to benefit from biofuel markets have been limited. The next chapter outlines the emerging biofuel sector in Tanzania to determine if biofuel production in the country is also following this trajectory or if in fact the sector is providing more benefits than threats to smallholders.

Chapter 3: Biofuels Production in Tanzania

Introduction

This chapter provides a nation-level perspective of biofuel production in Tanzania. It begins with a brief discussion of biofuel expansion in Sub-Saharan Africa to situate Tanzania within the context of production occurring elsewhere in the region. The chapter then provides a brief overview of Tanzania and its economy, particularly focusing on the agricultural sector, detailing how the sector has emerged since the colonial period and discussing problems that plague the sector.

The chapter examines the structural and institutional context in which biofuel production has occurred in Tanzania. This is done through a review of the overall policy framework in which biofuel production has operated, examining particular policies and their implementation. The chapter further describes the stakeholders involved in the industry and their impact on current policy practices. The chapter then discusses the sector as it exists currently, providing information on the companies involved, the production models used and the processes used to obtain land for production. An analysis is provided of the current role of smallholders in the sector, the impediments to their participation, and the mechanisms that exist to either limit or promote their participation.

3.1 Biofuels in Sub-Saharan Africa

Many of the non-oil producing countries of Sub-Saharan Africa are beginning to develop strategies, formulate legislation and implement support policies to encourage the development of the industry. Most African countries do not yet have fully articulated biofuel frameworks and policies. Reference to biofuels is often limited to mention of

alternative energy sources in country Poverty Reduction Strategy Papers (PRSPs) and government plans, and investors are expected to adhere to laws and policies in other sectors such as agriculture, forestry and energy.

Biofuel production in Sub-Saharan Africa has mainly been restricted to the production of biomass. Currently, about 550 million people or 75 percent of the population of Sub-Saharan Africa depend on traditional biomass such as wood, charcoal and cow dung (Ejigu, 2008). Africa is the largest producer of biomass energy, estimated by the IEA at 283 million tons of oil equivalent in 2004 (IEA, 2004). Modern forms of bioenergy such as bioethanol and biodiesel are expanding throughout the continent, but until recent years have been limited, often occurring only in industries where residues are available on site through processing, such as in timber mills and sugar factories and conversion efficiencies have been deemed fairly low (Johnson and Matsika, 2006; Amigun et al., 2008).

Although the total volume of biofuel produced is negligible in the overall fuel market, projects are continually being developed, pilot projects are being funded by research organisations and NGOs to test the potential for production and biofuel investors are increasingly looking to Sub-Saharan African countries to develop biocrop plantations. On a global scale, it is estimated that biofuel production using first generation technologies could realistically replace only a small amount of worldwide fuel consumption. However, for African countries, first generation biofuels can, it is argued, provide fuel self-sufficiency on limited areas of land (von Maltitz et al., 2009).

Biofuel production has attracted investment to varying degrees across Africa. In Ethiopia, only 2 percent of agricultural projects recorded at the Investment Promotion

Agency involved biofuel production. Countries such as Mozambique and Tanzania have, through government statements and policies relating to the industry, more enthusiastically championed biofuel production by emphasizing the benefits for rural development through increased participation in agricultural markets and rural electrification (Cotula, Vermeulen et al., 2009). Of the land earmarked for biofuel production, in some countries such as Madagascar, most of the allocated land is reserved for export-oriented cultivation compared to Mali where most biofuels are produced for domestic consumption. In countries such as Ethiopia, biofuels are produced for both purposes (Cotula, Vermeulen et al., 2009).

It is not possible to obtain up-to-date figures on the status and numbers of biofuel projects in operation or developing in Africa as new investments appear monthly and often are halted or cancelled and a large portion of projects are still in the planning phase. The proposed expansion in terms of an Africa-wide scale amounts to tens of millions of hectares (von Maltitz et al., 2009).

3.2 Background: Tanzania

3.2.1 Land and the Environment

The East African country of Tanzania, with a population of 42,483,923 people (WDI, 2008), is predominately rural. With 74.5 percent (WDI, 2008) of the population residing in rural areas, agriculture is the main economic sector in the country and more than 80 percent of the population are involved in agriculture and depend on farming for their livelihood (NBS, 2004). The sector accounts for 46.2 percent of Gross Domestic Product (GDP) (URT, 2005a). Of the total area of 947,300 km^2, 61,500 km^2 are inland

lakes and 344,326 km^2 are forest (FAOSTAT, 2007). Agricultural area, defined as the sum of arable land and permanent crops and permanent pastures, is 342,000 km^2 or 38 percent of total land area (FAOSTAT, 2007). The country is divided into 26 regions (21 on the mainland and 5 in Zanzibar) and further divided into 127 districts.

Table 1: Country Statistics

	2005	2006	2007	2008
Agricultural land (% of land area)	39			
Agriculture, value added (% of GDP)	46	45		
Forest area (sq. km)	352,570			
GDP (current US$)	14,141,921,494	14,331,230,929	16,825,553,037	20,490,444,784
GDP growth (annual %)	7	7	7	7
GNI per capita, Atlas method (current US$)	350	370	400	440
GNI per capita, PPP (current international $)	1,020	1,090	1,130	1,230
GNI, Atlas method (current US$)	13,382,263,615	14,518,209,602	15,934,006,977	18,349,916,098
GNI, PPP (current international $)	39,954,693,054	43,704,163,170	46,847,288,414	52,045,031,201
Life expectancy at birth, total (years)	54	55	55	56
Surface area (sq. km)	947,300			

Source: UN: HDI, 2005-2008

3.2.2 Agriculture and the Economy

The industrial sector of Tanzania is among the smallest sectors in the country, accounting for only about 17.4 percent of GDP (World Bank, WDI, 2006). Key industrial activities include the production of raw materials and processing of agricultural products. With a high degree of forest cover, the forest sector is particularly important, though it does not constitute a large portion of GDP. The country produces refined petroleum fertiliser and aluminium goods and construction materials and mines diamonds, tanzanite, gold, salt, gypsum, phosphates and kaolite. In the northwest of the country, coal and iron

ore deposits exist, while natural gas from deposits are used to produce electricity off the south central coast.

The agricultural economy is dominated by food production, which accounts for 85 percent of the 5.1 million hectares, which are cultivated annually (MAFSC, 2006). The Ministry of Agriculture, Food Security and Cooperatives (MAFSC) estimates that the land use in the country is as follows: farming and livestock at 47.5 percent; forest, bush land and woodland at 37.1 percent; water resources at 7 percent; wetlands at 8.6 percent; built areas at .3 percent; bare rock at .2 percent; and agriculture and livestock together form 46.9 percent of land use (MAFSC, 2006). The main agricultural food staples produced in the country include maize, cassava, beans and rice. Major cash crops produced include cotton, tobacco, coffee, sisal and cashew nuts. Smallholders produce oil crops such as groundnut, palm and sunflower, and many keep cattle, sheep and goats (NBS, 2006).

Tanzanian agriculture is currently constrained by falling labour and land productivity due to low levels of technological innovation, heavy dependence on rain-fed agriculture, soil degradation and desertification (Government of Tanzania website, n.d.). Widespread poverty among farmers can also be attributed to lack of fertile land, water shortages, inadequate government support and funding, and limited access to markets for their produce. The sector is further challenged by land issues such as inadequate tenure security for a majority of both rural and urban dwellers and conflicts in rural land areas, particularly between farmers and pastoral people as a result of town settlements encroaching on farming areas. Conflicts over land also have arisen with increasing

frequency as a result of tensions between granted rights and customary land rights (WWF, 2009).

Agriculture is dominated by smallholder farmers which cultivate between .9 hectares and 3.0 hectares each, mainly for their own subsistence. Food crop production dominates the agriculture economy with about 85 percent of crops under production devoted to food crops (Government of Tanzania website, n.d.). The smallholder sector, therefore, remains key to reducing poverty and achieving long-term growth and rural development (Sulle and Nelson, 2009).

Estimates indicate that 70 percent of agricultural land area is cultivated by hand, approximately 20 percent by ox plough and 10 percent by hand (Government of Tanzania website, n.d.). A very small percentage of all crops are cultivated on irrigated land, with most crops being rain-fed, cultivated mainly by women using hand tools, producing only one harvest per year (MAFSC, 2006).

Agricultural policy during the colonial era was geared towards encouraging foreign corporations and settlers into large scale plantation agriculture. Support was provided through farm inputs, labour, equipment and land which resulted in the alienation of large segments of land for the production of export crops (Tsikata, 2003). Following independence in 1961 (for Tanganyika and union with Zanzibar in 1964), the country adopted socialist and modernisation policies, which reorganised the agricultural sector through centralising authority, nationalising land and organising production around villages as part of the country's villagisation campaigns in the late 1960s to mid 1970s. To 'mobilize' villagers to settle in officially designated *ujamaa* villages, local Party and government officials resorted to 'commandist' methods, including a number of centrally

approved and highly organised 'operations', generally involving military mobilisation of entire Districts and Regions into settlements (Bernstein, 1981). Large farms were nationalised and millions were located to work on collective farms (Shivji, 1998). Land use in the villages was a mix of individual and communal farming. The direction of the economy, however, focused on integration into the global economy and increased production of export crops, did not change and arguably intensified during this period (Shivji, 1998). The parastatal sector operated with foreign capital and management, which included institutions like the World Bank and United States Agency for International Development (USAID) (Coulson, 1982).

In promoting state controlled industrial development, the government emphasized 'capturing' the agricultural market in order to use surplus revenue from agriculture to reinvent the industrial sector. With the subsidisation of farm inputs, the extraction of surplus profit from agriculture was regarded as not imposing any strain on farmers. According to Sundet (1994), the reality was that only a small portion of revenues was returned to farmers, the rest used in failed industrial projects that served to increase the country's dependence on foreign exchange for inputs such as spare parts and fuel (Havnevik et al., 1988) or absorbed through expansion of the bureaucracy and increased salaries (Sundet, 1994).

In the 1980s, Tanzania was facing an economic crisis with high inflation (around 30 percent), a high budget deficit, high balance of payments deficit, underutilised productive capacities and a lack of foreign trade. The country faced a shortage of both consumer goods and industrial inputs; inefficient distribution by the parastatal companies, which limited economic activity and agricultural production (Bevan and

Collier, 1993; Bevan et al., 1987; Ponte, 1998); and limited access to and poor quality of basic social services.

The 1980s ushered in a shift to liberal economic policies promoted by international financial institutions (IFIs) like the International Monetary Fund (IMF) through the country's Structural Adjustment Programme (SAP). The genesis of economic structural changes in Africa is traced to the Berg Report of 1981 in which the World Bank blamed inappropriate macroeconomic policies as the primary cause of low levels of GDP growth in the continent (Ponte, 2000).

The adoption of a neoliberal agenda involved such policies as the promotion of foreign investment and privatisation of state owned enterprises; reduction of agricultural subsidies, agricultural research and development and extension support; and the commercialisation of land, labour, and food (Ponte, 1998). Government spending in agriculture declined during this period, with allocations of funds to the sector comprising around 3.5-4 percent of GDP between 1998 and 2003 (MAFSC, 2006).

Structural adjustment was intended to revitalise the agricultural export sector (World Bank, 1981) but instead, as in other parts of Africa, led to de-agrarianisation rather than agriculture-based development (Wuyts, 2001). Any economic growth achieved in the country has more commonly been attributed to the growth in the informal sector in both urban and rural areas which has resulted in households relying on increasingly diversified sources of both informal and formal income (Wuyts, 2001).

Despite neoliberal promises that increasing integration into agricultural markets would enhance productivity of the sector and reduce levels of rural poverty, many contend that commercialisation has not increased agricultural productivity (Sokoni, 2008)

or fostered improved technological capacity and increased land and labour productivity, but has instead exacerbated rural poverty. During economic liberalisation in the 1980s and 1990s, labour productivity, crops yields and per capita production of food grains stagnated to levels lower than the 'crisis years' from 1979-1984 (Starstein, 2005). Market forces have contributed to the rise in prices of inputs and farm expenditures in the 1990s, particularly in remote areas, as availability of credit decreased (Ponte, 1998).

In terms of human development measures, Tanzania ranks on official UN lists of Least Developing Countries (LDC), Highly Indebted Poor Countries (HIPC) and Low Income Food Deficit Countries (LIFDC), with a human development index rating of .530, or 151 out of 182 countries surveyed. Reports indicate that 96.6 percent of Tanzania's population live on $2 US/day (HDR, 2009; HDR, 2007) and it is in the bottom 10 percent of the world's economies in terms of per capita income.

Table 2: Tanzania (United Republic of)'s Human Development Index 2007

HDI value	**Life expectancy at birth (years)**	**Adult literacy rate (% ages 15 and above)**	**Combined gross enrolment ratio (%)**	**GDP per capita (PPP US$)**
1. Norway (0.971)	1. Japan (82.7)	1. Georgia (100.0)	1. Australia (114.2)	1. Liechtenstein (85,382)
149. Haiti (0.532)	148. Senegal (55.4)	109. Guatemala (73.2)	141. Cambodia (58.5)	155. Bangladesh (1,241)
150. Sudan (0.531)	149. Djibouti (55.1)	110. Lao People's Democratic Republic (72.7)	142. Liberia (57.6)	156. Gambia (1,225)
151. Tanzania (United Republic of) (0.530)	***150. Tanzania (United Republic of) (55.0)***	***111. Tanzania (United Republic of) (72.3)***	***143. Tanzania (United Republic of) (57.3)***	***157. Tanzania (United Republic of) (1,208)***
152. Ghana (0.526)	151. Ethiopia (54.7)	112. Nigeria (72.0)	144. Ghana (56.5)	158. Haiti (1,155)

153. Cameroon (0.523)	152. Kenya (53.6)	113. Malawi (71.8)	145. Myanmar (56.3)	159. Comoros (1,143)
182. Niger (0.340)	176. Afghanistan (43.6)	151. Mali (26.2)	177. Djibouti (25.5)	181. Congo (Democratic Republic of the) (298)

Source: UNDP, HDI, 2007

3.3 The Biofuel Environment: Tanzania and the Global Biofuel Context

Tanzania presents a good case for studying the biofuel industry and its ability to integrate smallholders. While in recent years there has been an expansion of large scale land acquisitions for biofuel production, Tanzania has been recognized as a country with a number of small scale initiatives, many of which have promoted the cultivation of Jatropha in conjunction with research institutes, local community groups, foreign researchers and local and international NGOs through contracts with seed buyers. It has, however, been under increasing criticism as foreign investors have accumulated greater amounts of land.

Biofuel investors have been present in Tanzania since 2000, but the sector expanded significantly in 2006. Various sectors including NGOs, international donors and local and international investors, in a climate of growing national and international political support, have promoted biofuel expansion in Tanzania. This expansion has occurred both as a result of external pressures and incentives and national impetus. The Government of Tanzania has promoted biofuel expansion to improve energy security, create new industries, introduce alternative cash crops for both small and large scale farmers, create new jobs and income opportunities, reduce oil imports, generate foreign exchange savings and protect the environment (MEM, Feb. 20, 2008).

Bioethanol and biodiesel hold the promise of providing an alternative to both current sources of biomass, which have proven destructive to the environment, and imported oil which amounted to $1.5 billion US in 2007 or 40 percent of the country's total export earnings (Bank of Tanzania, 2008). With some of the highest tariffs on power in the region, electricity has been inaccessible not only for many people in rural areas, but also for the urban poor, with the government estimating that only about 10 percent of the population has access to electricity, and in rural areas less than 2 percent of the population (URT, EWURA, 2009). This has led to overdependence on woodfuels, such as firewood and charcoal, which are becoming increasingly scarce and rising in cost. Tanzania uses an estimated 40 million metres^2 of land for the production of charcoal and firewood, which has caused serious deforestation (Rugonzibwa, March 14, 2010).

It is surmised that being located in a region with several net oil importers places Tanzania in a position to be a major regional supplier of biofuels (Kamanga, 2008). A feasibility report commissioned by the government declares that the country has the potential to become a major supplier to world markets as it lies along the Indian Ocean (GTZ, 2005).

The recent expansion of biofuels in the country, though driven in part by internal promotion of biofuel production, has largely been influenced by external demand. Global biofuel investors in Europe, Asia and the US, limited by few opportunities for investment at home, have been attracted to Africa's perceived abundance of unused agricultural land, water and labour (Kamanga, 2008). For investors, Tanzania has geographic and climatic conditions favourable to growing a wide range of crops such as sugar cane, palm oil, Jatropha, soy, cassava and cotton, among others. When investors began to apply for land

for biofuel production in 2005/2006, reports from international organisations and government sources indicated that the country had as much as two-thirds of land area available for agricultural production. Tanzania boasts three of the largest 10 lakes in the world and a large network of rivers, plus many areas of the country have significant irrigation sources. Tanzania has also been considered a favourable choice for foreign investors because of its economic liberalisation policies and investment policies to protect foreign investment combined with its political stability, democracy and low rates of violent crime in comparison to many countries in the region.

Some academics, activists, researchers and community members have maintained that biofuel production for smallholders offers no new rural development opportunities but instead follows the pattern of development that emerged with large scale mining and coffee production, serving only to wrest control of lands from villages, much like other agricultural development projects of the past. Following enticing promises from large scale investors, small scale producers were talked out of their land to make way for coffee plantations decades ago, and for mining sites in the 1990s. Promises of well-paying jobs, new roads, wells and school never materialized (Knaup, 2008). Among the other arguably failed attempts at large-scale agricultural production and modernisation is the Tanzania-Canada Wheat Project, that was promoted in the Hanang district to bring food self-sufficiency through the establishment of large-scale mechanized what production on the Basotu Plains in the northern part of the country By the late 1980s, the project had numerous negative social and environmental impacts such as the alienation of Barabaig pastoralists from their land (Rogers, 2004).

The 1990s also witnessed an influx of investors promoting moringa and castor production through contract farming schemes with smallholders. Like Jatropha, castor and moringa were considered suitable for production in semi-arid and arid areas. After a few harvests, prices declined due to competition from other developing countries in Asia and Latin America and interest in the crop fell and farmers were left with converted land and unsold crops (Habib-Mintz, 2010).

3.3.1 Land Available for Biofuel Production

The amount of land deemed available for biofuel production, even without taking into consideration prior use and conflict with food production, is generally much higher than in reality. Various actors estimate that almost two-thirds or 550,000 km^2 of Tanzania's land area is 'arable' (Ngeleja, 2008), 'potentially available for agriculture' (WWF, 2009) or is 'potential area for rain-fed crop production' (Mwamila et al., 2009; GTZ, 2005); the Tanzania Investment Centre estimates that 583,000 km^2 is available for agricultural development (TIC, 2008). A feasibility study conducted through the German Technical Corporation (GTZ) in 2005 reported that Tanzania possesses 880,000 km^2 of agricultural land of which only 6 percent is currently being used (Kearny, 2006). However, the FAO indicated that agricultural area was 342,000 km^2 (38 percent of the total land area) and permanent crops comprised 12,000 km^2 in 2007, which is much lower than figures frequently generated in government, NGO and even academic reports (Haugen, 2010). Many reports apply the figure for potential for rain-fed crop production as equivalent to the amount of area that can be set aside for agricultural production. Although the difference between agricultural land and arable land may not appear to be

significant in terms of semantics, it is great in reality, as the former includes pastures and meadows (Haugen, 2010).

3.3.2 The Biofuel Policy Environment

The Government of Tanzania, led by the President and Cabinet, has identified the biofuel industry as a priority growth sector and has been willing to create an investment climate conducive to its promotion. Efforts to promote alternative energy generally occur through the Ministry of Minerals and Energy (MEM). In regards to energy, the MEM declares its mission to be to "provide an input into the development process of the country through establishment of a reliable and efficient energy production, procurement, transportation, distribution and end use system in an environmentally sound manner (MEM website)."

Within the MEM, the Energy and Petroleum Division generates initiatives and recommendations relating to bioenergy. According to division experts, biofuels are capable of meeting the country's energy needs. In a 2006 briefing note on biofuels in Tanzania, no real threats to biofuels expansion in the country were identified; the document suggested that world trends in technological and commercial expansion of the industry are very positive (MEM, 2006). The MEM does, however, indicate that biofuel expansion within the country should safeguard 'national interests' and ensure that the benefits of production remain within the country (MEM, 2006).

Biofuels also are eluded to in the National Energy Policy of 2003, which affirms the government's desire to develop and use renewable sources of energy without explicitly naming biofuels (MEM, 2003). The government set up the Rural Energy

Agency (REA) in 2005 to facilitate development of projects that are operated and owned by private investors, NGOs and community-based organisations (CBOs). In addition, they established the Rural Energy Fund (REF) to provide subsidies in order to reduce risks for project development. The mission of the organisation is to promote modern energy services in rural areas through administrative processes, project implementation and policy development. While these initiatives have indirectly promoted biofuel expansion, they are not specific to biofuels (van Eijck and Romijn, 2008).

In the country's National Strategy for Growth and Reduction of Poverty (NSGRP), introduced in 2005, biofuel industry development targets are included, such as the goal that at least 10 percent of the population use alternatives to wood fuels for cooking by 2010 and increase solar, wind and biomass for electricity generation from .35 percent in 2003 to 3 percent by June 2010 (URT, 2005b). Biofuel industry targets are also included in the Tanzanian Development Vision 2025 (URT, 2000).

3.3.3 Biofuel Stakeholders

There are many stakeholders involved in the promotion of biofuel expansion, formulation of biofuel policy, production of biocrops, development of biofuel technology and provision of other support to the industry, which shape the direction of biofuel policy and debate within the country. Foreign interests, biofuel investors, international governments, and donors have largely driven biofuel development.

Government Agencies/Departments/Bodies

The Government of Tanzania has played a role in promoting biofuel development through the Office of the President, the MEM, the Ministry of Finance and Planning (MFP), and the Ministry of Agriculture Food Security and Cooperatives (MAFSC). The Tanzania Investment Centre (TIC) is the primary government agency tasked to encourage, coordinate, promote and facilitate investment in Tanzania and is responsible for advising the government on investment related matters. As mandated by the Tanzania Investment Promotion Act (TIPA), it provides assistance to investors in matters such as incorporating businesses, obtaining licenses and approvals, filing immigration forms and processing Value Added Tax (VAT) forms (Morgera et al., 2009). The TIC is responsible for facilitating biofuel investments on government lands (IFAD, 2009). When investors meet capital requirements, the project is then eligible to be registered with the TIC and receive a certificate of incentives, which allows investors then to reap the benefits provided to them through the investment act. In order to facilitate this process, the TIC has set up a land bank of 2.5 million hectares of land deemed suitable for investment. Of this amount, the TIC has identified 1,100,398 hectares of land for agriculture; 1,469.47 for housing estates; 537,880.60 for industry; 445.80 for mining, 238,939.20 for ranching; and 711,027.80 for tourism (TIC website). The TIC has been generally receptive to biofuel investors. As noted by the centre, biofuel production is critical for achieving sustained economic growth, poverty reduction and rural development.

The Office of the Commissioner of Lands has also played a role in the land allocation process. Due to the nature in which land acquisitions are taking place (to be described in a latter section), local levels of government have been instrumental in the

biofuel development process. Local District Councils, Village Councils, Village Assemblies and respective Members of Parliament have been responsible for accepting or rejecting applications made by investors to acquire land for biofuel investments. However, no information is available to indicate whether or not village assemblies have rejected land proposals following endorsement by the national government.

Donors

In Tanzania, international donor interest and support has been offered to the sector through international financial institutions and international development agencies. The Swedish International Development Institute (SIDA) and Norwegian Agency for Development Cooperation (NORAD) have both provided support for the National Biofuel Task Force to finalize the biofuel development guidelines, support a project monitoring unit and hire biofuels experts to support the Tanzanian government. The government has signed a memorandum of understanding (MoU) with the Swedish Energy Agency (STEM) to assist existing and planned biofuel activities and to review policies, laws and institutional structures relating to biofuels (Kumanga, 2009). The German Technical Corporation (GTZ) has also supported biofuel development in Tanzania. In a feasibility study undertaken by the organisation in 2005, it suggested expansion of biodiesel crops, such as Jatropha, as important for agricultural development under the 'right' incentives and policies. GTZ has provided support for the German energy company, Prokon, which has initiated contract Jatropha cultivation among smallholders in Tanzania. The Dutch government has also been "involved in various

initiatives related to sustainability criteria" and provided funding to the Dutch company, Diligent which also produces Jatropha through contract farmers (Timberwatch, n.d.).

In August 2009, the US government announced its intention to provide $5.4 million US to the Tanzania government for a project to establish a model for Jatropha farming in the country. Funding was provided under the Jatropha Agriculture and Nutrition Initiative (JANI), a project of the US Agency for USAID (Biofuels Digest, August 20, 2009).

International organisations such as the FAO have also been actively involved in championing the industry in Tanzania. The FAO consulted with the government in designing biofuel guidelines in 2008 and has also initiated the BioEnergy Food Security (BEFS) analytical framework, with which Tanzania has been involved. The project, which also includes Peru, Cambodia and Thailand, aims to pilot sustainable bioenergy projects that do not compromise food security and promote the exchange of knowledge and strengthened institutional capacity in order to influence bioenergy policymaking (WWF, 2009). In Tanzania, the project works closely with the Ministry of Agriculture, Food Security and Cooperatives and the Ministry of Energy and Minerals. The project is examining the extent to which the agricultural sector can support bioenergy in the country and whether of not it can do so to benefit the poor (FAO, 2010). Rather than focusing on how biofuel production in the country may displace food production, the project analyses how to "regenerate a stagnant agricultural sector" to improve yields and raise incomes (FAO, 2010: 14). The study argues that the country's land is highly suitable for cultivation of the cassava crop, from which ethanol could be produced without affecting food security, particularly through the use of outgrowers. The analysis

has further made the case that there is no trade-off between biofuels expansion and food crops but rather, it is more likely to be a trade-off between biofuels and traditional export crops (Beyadi, 2010).

Private Investors

Private sector involvement in biofuels has come predominately from companies interested in producing biocrops for the transport sector, and is mainly comprised of companies already involved in the selling and marketing of oil products for transport (Kamanga, 2008). The largest investors in biofuel production in the country are energy companies from Europe and the US. The largest investors to date in Tanzania are Sun Biofuels of UK, Prokon of Germany, Diligent and Bioshape of the Netherlands, Africa Biofuel and Emission Reduction Company Ltd (a joint US/Tanzanian venture), CAMS Energy Group (a Tanzanian subsidiary of a UK energy company), and Bio Massive and SEKAB of Sweden.

Research and Academic Institutions

Research and academic institutions have played a growing role in the sector in various ways, from conducting feasibility studies on which crops are most suitable for production in which regions to analysing the relative success of existing projects. They have also provided outreach support and engaged in Environmental Impact Assessments to quantify compensation for villagers whose land is acquired for production, as well as undertaking research on developing new technologies for processing biofuels and conducting training (Kamanga, 2008).

Some of the Tanzanian universities and colleges which have been or are currently involved in biofuels research include the Sokoine University of Agriculture, University College of Lands and Architectural Studies Institute of Resource Assessment (IRA), Ardhi University and the Departments of Chemical Process and Engineering and the Department of Botanics at the University of Dar es Salaam (UDSM) (Kamanga, 2008; Roks and van Vlimmerman, 2008). Institutions involved in the development of the Jatropha sector have included the Seliani Agriculture Research Institute Arusha (SARI) and the Tanzania Industrial Research and development Organisation (TIRDO), which is a research institute under the Tanzanian Ministry of Industry, Trade and Marketing (Roks and van Vlimmerman, 2008) and the Centre for Agricultural Mechanization and Rural Technology (CAMARTEC) in Arusha, which has worked in partnership with a local NGO to provide oil extraction technology. The Japanese Tottori University, along with the Tanga-based Mingano Agricultural Research Institute in Tanzania and Sekisui Chemical Co. Ltd are investigating the impact of Jatropha production on Tanzania

Research institutions have contributed to studies and reports assessing the socio-economic impact of biofuel investments; researchers have strongly criticizing large scale accumulation of land by foreign biofuel investors (see eg. Mwanila et al., 2009), with one researcher from Sokoine University of Agriculture stating that the government was treating biofuels investments like a "bottomless pit" at the expense of farmers (Mande, Oct. 5, 2009).

Overall, research projects in the energy sector have been characterised by a lack of coordination. Further, much of the research emerging about the industry in Tanzania has originated from foreign institutions/researchers/organisations. There is a definite

paucity of locally-articulated, comprehensive studies. Most of the literature emerging in the first few years of biofuel expansion in the country has focused on the perceived strengths and opportunities with very little attention given to the threats or weaknesses. The potential success of biofuels in Tanzania has been deemed conditional on the provision of employment, infrastructure, proper regulation, and other favourable factors (Kamanga, 2008). For the most part, meaningful discussion of drawbacks and negative implications has been absent.

Companies and Organisations Developing Biofuel Technologies

Various companies and organisations have been involved in researching and developing technology to use renewable energy sources. Many have involved using Jatropha as an energy source, either through conversion to biodiesel or use of pure Jatropha oil, known as straight vegetable oil (SVO).[3] The Kilimanjaro Biofuels Corporation Limited (KBC) is a private company, which was established in 2006 to research and develop opportunities for promotion of Bio Jet Fuel from Jatropha.

Bringing Energy Services to Tanzanian Rural Areas (BEST-RAY), a European Union Commission funded project (2008-2011), is attempting to set up a system to provide energy services to poor underserved rural communities living in the Arumeru District of Northern Tanzania. BEST-RAY is focused on providing affordable, sustainable and renewable energy through the provision of training, equipment,

[3] Straight vegetable oil (also known as pure plant oil) is an alternative fuel for diesel engines and for heating oil burners. It is produced via vegetable oils derived from oil seeds through either mechanical pressing or solvent extraction. SVO can be used as automobile fuel but is not suited to use in regular diesel engines because of its fuel properties (that is, a very high viscosity, poor thermal and hydrolytic stability and less favourable ignition qualities (low cetane number)). It can be used in engines only if they are specially adapted for SVO.

technology and institutional assistance to start small businesses in the energy sector, such as in the production and marketing of improved stoves that use biodiesel. The Jatropha Agriculture and Nutrition Initiative (JANI) is a three year project (2008-2011) funded by a United States Department of Agriculture grant to Partners for Development (PFD). PFD project objectives are to increase and diversify incomes of smallholders through production, processing and marketing of Jatropha (PFD website).

The ProTREE project of Pamoja Inc, a US and Tanzanian based non-profit organisation has been working with non-edible plant oils as a liquid fuel alternative, with particular emphasis on Jatropha and the use of Jatropha oil in lamps and stoves (Pamoja website). Fairtrade International has also been researching Jatropha as a fair trade product in the country.

The Programme for Basic Energy and Conservation (ProBEC) is a Southern African Development Community (SADC) programme implemented by GTZ in 10 countries: Lesotho, Malawi, Zambia, Tanzania, Mozambique, Namibia, Zimbabwe, Swaziland, Botswana and South Africa. Among the projects that ProBEC has supported is the development of a Bosch-Siemens PROTOS plant oil stove, which uses Jatropha oil.

Civil Society Organisations

Civil society organisations and the local media have also been involved in the industry – from NGOs to environmental advocacy organisations to media organisations – although to a much lesser degree and with substantially less visibility (Kamanga, 2008).

Organisations that have been increasingly critical of biofuel development in the country have included the Tanzanian environmental and human rights organisation,

Environmental, Human Rights Care and Gender Organisation (Envirocare) which has promoted small scale farming of Jatropha (WWF, 2009). It produced a report which was highly critical of large scale land accumulation for Jatropha production in the country (Envirocare, 2008). Another environmental group that has been outspoken in their criticism of large scale biofuel expansion is the Tanzania Forest Conservation Group (TFCG).

Over the last five to ten years, local NGOs have been established to promote rural electrification and develop income-generating projects through production of Jatropha. The NGOs include Jatropha Products Tanzania Ltd (JPTL), KAKUTE (The Technology Extension Company Ltd.) and Tanzania Traditional Energy and Development Organisation (TaTEDO). Some have began to develop stoves and lamps that can use Jatropha oil as a substitute for wood and kerosene. Many organisations have promoted the cultivation and use of Jatropha not for fuel but for soap making as an income – generating project for women for both commercial and local use, but not for export.

Other NGOs that have been involved in the biofuel sector through advocacy and research activities, including the Land Rights Research and Resources Institute (HAKIARDHI/ LARRI), Legal and Human Rights Centre (LHRC) and Lawyers Environmental Action Team (LEAT). The market research NGO *Faida Mali* Market Link has provided market research into Jatropha and the media organisation, Journalists for the Environment (JET), has been a prominent forum on environmental issues.

International NGOs

International non-governmental organisations have both endorsed biofuel cultivation in Tanzania and provided intense criticism about the path of production the country is currently following. Environmental groups, in particular, have cautioned the large scale expansion of the industry for export, particularly in the absence of accountability and transparency measures for investors and systematic monitoring procedures for acquiring land. The African Biodiversity Network (ABN) argues that biofuel production in the country has evicted farmers from their land, denying them their only means of livelihood and food production, and will divert valuable water resources toward production of fuel crops, leading to inevitable conflict. ABN contends that the desire to participate in biofuel export markets will deepen poverty and insecurity in countries like Tanzania (ABN, 2007). Organisations such as Oxfam, Action Aid and Christian Aid have all released reports critical of biofuel expansion in developing countries, citing examples of large scale accumulation of land which has displaced rural small scale producers (Action Aid, 2010; Christian Aid, 2009; Bailey, 2008).

Table 3: Foreign Support for Biofuels in Tanzania

Agency providing support	Country of origin	Type of support	Details
Swedish Energy Agency (STEM)	Sweden	Supported the review of policies, laws, institutional arrangements relating to biofuels in Tanzania	
Swedish Agency for International Development (SIDA)	Sweden	Provided $3 million US to support the development of biofuel guidelines	
Norwegian Agency for Development Cooperation (NORAD)	Norway	Provided support for the National Biofuel Task Force to finalize biofuel development guidelines; provided funding to TaTEDO	

United States Agency for International Development (USAID)	US	Provided $5.4 million US under the Jatropha Agriculture and Nutrition Initiative (JANI) project to establish a model for Jatropha farming in the country	Project will cover 6800 farmers, initially in the Kilimanjaro, Arusha and Singida regions and the Kondoa district in Dodoma region, and later expanding to Tabora, Mara, Shinyanga, Mwanza and Kagera by 2012
FAO		Assisted in designing Tanzania Biofuel Guidelines; initiated Bioenergy Food Security analytical framework which involved Tanzania	
GTZ	Germany	Provided funding to Prokon; conducted extensive feasibility study on the industry	
Dutch government	Netherlands	Involved in initiatives relating to sustainability criteria; provided funding to Diligent	

Sources: Kamanga, 2008; Sulle and Nelson, 2009; Rugonzibwa, March 14, 2010; Timberwatch, n.d.

3.3.4 Impact of Stakeholders on Biofuel Development

Despite the assertion that biofuel production has the potential to be harnessed to serve domestic energy needs and provide much needed rural development opportunities, the current expansion and future direction of biofuel production is greatly influenced by external forces. Foreign governments, companies and institutions have promoted the industry by meeting with government officials, organising biofuel conferences and discussions in the country and conducting feasibility studies. Tanzania has required external technical, intellectual and financial support to develop the industry. As a result, the extent to which the biofuels industry can support national self-interest remains to be seen.

3.3.5 Laws and Policies Currently Regulating the Industry

In the absence of a biofuel framework, the expansion of biofuel initiatives has thus far been regulated by existing policies and laws in sectors such as energy, land,

agriculture, investment, forestry, trade, employment and science and technology. Policies such as the Transport Policy or National Forest Policy do not directly mention alternative energy sources, and others refer to alternative energy in the general sense, but not biofuels specifically.[4] The laws and policies are fragmented and situated in various legislative acts and in many inter-related sectors (Mwanila et al., 2009).

Bioenergy investors are subject to the same limited rules and regulations that investors in the field of infrastructure and development face (Morgera et al., 2009). The country's investment and trade laws are considered relatively friendly to foreign investment (Mwanila et al., 2009; Kamanga, 2008, Sulle and Nelson, 2009). The Trade Policy for a Competitive Economy and Export-led Growth of 2003 emphasized the necessity for Tanzania to provide a welcoming business environment and use the private sector to drive economic development and growth and enhance participation in global markets through trade liberalisation (Morgera et al., 2009).

As outlined in the Investment Law (1996), foreign investors or joint venture projects with initial capital of $300,000 US (or the equivalent in local Tanzanian Shillings - Tsh) and Tanzanian investors with capital no less than $100,000 US enjoy favourable conditions (URT, 2008). The Law promotes economic liberalisation and enables positive business conditions by providing tax incentives and private investment guarantees and zero taxing for imported capital goods, VAT deferment, 100 percent repatriation of profits and capital investments, guarantees against expropriation and land rent reductions (URT, 2008; Kearney, 2006). Investors seeking land for biofuel

[4] For a detailed description of policies and legislation relating to bioenergy in Tanzania see Morgera et al., 2009.

production are governed by the Land Act (1999) and the Village Land Act (1999).[5] According to provisions of the Land Act, land can be owned through granted rights of occupancy, customary rights of occupancy or through derivative rights through the TIC. Non-citizens can only obtain rights to occupancy if it is intended to be used for investment purposes and registered with the TIC (URT, 1999).

The Land Use Planning Act was formalized in 2007 to govern land for competing uses and outlines procedures for the preparation, administration and enforcement of land use plans. It established the National Land Use Planning Commission[6] to oversee land use plans in the country. All villages, districts and regions are to develop land use plans and register them with the commission. In theory, allowing land use to be determined at the village level rather than in a centralised manner is more conducive to protecting local interests. However, in practice, creating land use plans has been a time consuming and costly process (Morgera et al., 2009), which poses challenges for under-resourced and at times under-qualified, village representatives (Mwanila, 2009).

Laws that pertain to the regulation of the industry in regards to environmental standards include the National Environmental Management Act (NEMA) of 2004. The NEMA prohibits the implementation of projects that are considered likely to have a negative impact on the environment. The National Environmental Policy (NEP) of 1997, which falls under NEMA, mandates that biofuel production is subject to emission control measures and environmental impact assessments (EIAs) as well as environmental audits and an inventory for pollution control (Morgera et al., 2009). All large scale investments

[5] The Land Acts will be discussed in greater detail in later sections.
[6] The National Land Use Planning Commission is comprised of representatives of the Ministries of Lands and Human Settlement; Agriculture, Food Security and Cooperatives; Livestock Development and Fisheries; Economic Planning and Development; and Environment, Natural Resources and Tourism and Water and Irrigation (Morgera et al., 2009)

in biofuel production, processing or storage require EIAs (Morgera et al., 2009). The Act stipulates the involvement of a registered EIA expert as well as public hearings and public postings of the expected socio-economic impacts of the project on the local community and the country, more general (URT, 2004).

The Government of Tanzania has not yet instituted any blending requirements or mandatory targets for biofuel production. The Revised Petroleum Act (2008), to be implemented by the president, includes provisions referring to plant fuels and blending of biofuels with petrol. As noted in a World Wide Fund for Nature (WWF) report (2009) entitled *Biofuel Industry Study: An Assessment of the Current Situation*, the Act would allow the Minister responsible for the energy sector to mandate blending ratios and targets throughout the country, which would affect the domestic markets for biofuels.

While the industry has been subject to various existing investment and environmental laws, expansion has not occurred in accordance with these disparate procedural guidelines and laws. The tax and incentives structures and gradual process for processing business permits as well as "inefficiencies of statutory institutions" (Jumbe, 2009) have posed a challenge to foreign and domestic biofuel investment, thus creating inconsistencies, and allowing for corruption, misuse of existing laws and a lack of transparency.

3.3.6 National Biofuels Policy

The government has facilitated the process of establishing a national biofuels policy by establishing the National Biofuel Task Force[7] in 2006 to promote biofuel

[7] The Biofuels Task Force is comprised of individuals from the following ministries/organisations: Ministry of Energy and Minerals (MEM); Vice President's Office (Division of Environment); Ministry of

development and formulate legislation, policies and regulations for its production through the Ministry of Energy and Minerals (MEM), with support from the Swedish Energy Agency (Martin et al., 2009).

In December 2009, the Government of Tanzania passed the *Guidelines for Sustainable Liquid Biofuels Investments and Development in Tanzania*, which included sustainability production criteria to regulate changes in land use, protect water, biodiversity and soil and protect local communities as well as biofuel seeds management. The guidelines officially were launched in July 2010, coinciding with the establishment of the Biofuels Project under the Ministry of Energy and Minerals, with funding from the Norwegian and Swedish governments. This is a two year project aimed at formulating the country's official biofuel policy with the assistance of technical personnel from other ministries. The policy will provide guidance on existing laws and procedures and a framework for the institutional arrangements through which biofuel investment and production may occur, in addition to clarifying sustainability production criteria.

The guidelines detail application procedures and considerations for investors, such as land acquisition, contract farming and sustainability (FAO, 2010). The guidelines also institutionalise the Tanzanian Investment Centre (TIC) as a Biofuels One Stop Centre, which is responsible for coordination, endorsement and monitoring of biofuel investments, and indicate that the MEM will establish a Biofuels Technical Advisory

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Labour; Employment and Youth Development; Ministry of Finance; Ministry of Water and Irrigation; Ministry of Agriculture, Food Security and Cooperatives; Ministry of Housing, Land and Settlement; Ministry of Planning, Economy and Empowerment; Attorney General's Chambers; Tanzania Investment Centre; Tanzania Petroleum Development Corporation (TPDC); Community Finance Limited (CFC); and Tanzania Sugar Producers' Association (TSPA) (WWF, 2009; Sulle and Nelson, 2009).

Group (BTAG) to provide technical/professional advice on biofuels development and investment issues (MEM, 2010).

The guidelines specify that companies must provide an Environmental and Social Impact Assessment (ESIA) report to the National Environmental Management Council (NEMC) and a feasibility study to the Biofuels One Stop Centre. Projects are only to be accepted after approval of the feasibility study and receipt of the ESIA certificate. The NEMC will then advise the minister responsible for the environment if the potential investors should be granted an ESIA certificate. Investors are also required to receive permits related to the following aspects of biofuels: (1) surface water; (2) ground water; (3) specified biofuel crops in a specified location; (4) import and export of seeds; (5) co-generation; (6) power plant installation; (7) processing of liquid biofuels; (8) plant installation; (9) local marketing and distribution; and (10) export and transportation (MEM, 2010). After project approval, registration will then follow normal TIC investment procedures.

With the passage of these guidelines, investors are restricted to accumulating 20,000 hectares of land, which is still a significant amount of land for a foreign entity to control. Currently, the land area accumulated by a few companies has exceeded that limit.[8] Leases are to be limited to 25 years, significantly lower than the 99 years granted to a few biofuel companies in the past few years.

The guidelines indicate that to ensure that biofuels production has a "positive impact on food production," investors/developers shall set up to 5 percent (exact figure to be issued by the TIC) of land acquired for biofuels production to grow relevant food

[8] It is difficult to obtain figures on land accumulation as land deemed 'accumulated' by investors, researchers or the government is at varying levels of approval or development.

crops by "applying the state of the art agricultural techniques" (MEM, 2010). Investments approved before operationalisation of the guidelines are to be assessed to ensure compliance. However, the guidelines fail to identify when existing biofuel projects will be re-evaluated and whether investors granted more than 20,000 hectares or those granted leases surpassing 25 years will be forced to abide by the new guidelines.

The government acknowledges the need to monitor the industry to ensure that projects take into account principles of sustainability, but does not elucidate how this will be achieved. The word 'sustainable' appears a few times in the biofuels guidelines, but principles or specific policies or mechanisms are not outlined to achieve this goal. The government has also indicated that it is developing provisions to enable the involvement of small scale producers, but exactly how smallholders are to be integrated is unclear (Cotula, Vermeulen et al., 2009). The new guidelines are designed to protect local communities and ensure that biofuel investments provide benefits to the local community in a meaningful way. The document is replete with terms like 'contribute positively to....' without specifying precisely what this entails or how it will be enforced. For instance:

a. Activities towards production of biofuels contribute positively to local economy.
b. Activities towards production of biofuels contribute positively to social well-being of employees and local population.
c. Priority on employment opportunities are given to the community in the locality (MEM, 2010).

The MEM has expressed an intention to review existing policies and legislation relevant to biofuels development and propose revisions and amendments to some policies as well as facilitate a review of the National Land Use Plan to identify 'suitable' land for biofuels through mapping and zoning (Mawihava and Rwebangila, 2008). The timeline for this process, or the depth of the review is unknown.

3.3.7 Mechanisms to Promote Sustainability and Reduce Risks

In the absence of a clearly defined biofuel framework, mechanisms are not currently in place to ensure that labour relations, child labour, and health and safety considerations are taken into account in allocating land for biofuels production or monitoring existing projects. The WWF (2009) alleges that although Tanzanian law requires that investors take such matters into consideration, these practices are not enforced.

For example, biofuel investors are bound by provisions of the Forest Act that outline a comprehensive regulatory framework governing access to and protection of forest resources. However, biofuel investors have not been forced to abide by specific provisions of these acts. According to the WWF, over half of the investors did not carry out EIAs before being granted land (WWF, 2009). Two of the EIAs conducted were considered insufficient, ambiguous and did not take into account that these potential investments were proposed for areas with high biodiversity and resources from which many villagers derived their livelihoods.

General principles of sustainability and food security are emphasized in various government policies and laws, but without providing clear guidelines and procedures for achieving such objectives. Further, such principles have largely been ignored in relation

to biofuel investments. For example, the Food Security Act of 1991, which addresses issues relating to food security in the country, stipulates that food security issues take precedence over other issues, including energy security (Morgera et al., 2009). While a worthwhile objective in principle, in practice no mechanisms currently exist to ensure adherence. The Land Use Planning Act (1999) similarly sets out to protect Village Lands from arbitrary allocation to investors, but has not done so in reality.

Biofuel investors and Tanzanian government infuse the biofuel discourse with rhetoric of environmental and social sustainability, but few details, either from the government or the investors themselves, exist on how precisely these objectives will be met (WWF, 2009). To date, mechanisms do not exist in current investment policies to promote the integration of smallholders in biofuel markets. Limited policy support exists to help small scale producers 'take advantage' of higher value export crops. Currently, there are no micro-credit programmes or widespread and effective extension services that can assist smallholders in growing different crops (Caniels and Romijn, 2009). This has meant that farmers wanting to grow biofuel crops often have to do so through outgrower or contract schemes. Government support of smallholder integration in biofuel markets has so far generally been restricted to encouragement of contract/outgrower or hybrid models of production in the biofuel guidelines and policy statements. The government encourages outgrowers to form associations/cooperatives but does not specify under what conditions or how outgrower schemes may be monitored (MEM, 2010).

3.4 Overview of Biofuel Activity

Many biofuel initiatives in Tanzania of various scales currently exist. Most projects are still in initial stages, many having acquired land but not yet commenced production, and many more awaiting confirmation of land acquisition. The number of biofuel initiatives currently being planned, in production and being requested is unknown, with numbers ranging according to the source and definition of biofuel initiative.[9]

There is a discrepancy in the information on biofuel production from researchers, investors, newspapers and the government. Company websites generally provide an overview of company plans, with projections of input, land acquired and compensation provided higher than other sources. Investors present figures of land area acquired that have not yet been approved and the actual amount granted is lower than the amount requested. It is difficult to attain information on the status of each operation as company websites or public statements in newspapers, for example, generally focus on future plans rather than the current project status.

Figures on biofuel production emerging from the Government of Tanzania tend to be much lower that those emanating from international NGOs and international and national research institutions that have relied both on publicly available figures and extensive field research to compile their estimates. This suggests that many projects are not registered with the government, and/or perhaps that the government is underreporting

[9] Some studies, when compiling biofuel figures in Tanzania, include small pilot projects involving cultivation or promotion of crops like Jatropha or organizations working on developing technologies for the processing of biofuel feedstocks while others simply focus on companies developing plans to produce feedstocks for biofuel production only.

the number of projects and the amount of land being acquired. The tables presented below provide information currently available on projects from a review of articles, studies, government reports and documents and public statements. This analysis tended not to rely on figures presented by investors. With the exception of information attained from a few Tanzanian newspaper reports, much of the data is based on information available as of March 2009.

The number of investors that have endeavoured to acquire land far surpasses the number of projects that have been accepted for land acquisition and the number registered with the Tanzanian Tax Authority. As of December 2008, only 7 international companies were registered with the authority whereas 64 companies had sought land from the Ministry of Agriculture, Food Security and Cooperatives (Habib-Moltz, 2010). Further, 45 companies and individuals are listed in a MEM table of biofuel actors in the country (MEM, 2008b). However, by March 2009, the government had reported only 20 investors involved in the industry.[10]

A study of the industry, undertaken with support of USDM and the Land, Rights Research and Resources Institute (LARRI), indicates that as many as 37 companies/entities of varying types are currently engaged in bioenergy development. Of the projects that are further along in the acquisition process, thirteen are foreign corporations (mainly energy companies), six are local, four are joint venture operations between foreign and local investors and the rest are currently unspecified (Kamanga, 2008). Many projects offer very little information beyond the name of the company and the area where it intends to initiate a biofuel project. Most investors have indicated they

[10] Speech by Permanent Secretary of the Ministry of Energy and Minerals at the Biofuels Workshop, 1 December 2008, at the Blue Pearl Hotel, Dar es Salaam) as referenced in Kamanga, 2008.

intend to use contract farmers, but only a few are currently using outgrowers (Kamanga, 2008). Three are planning to work on promoting, processing and supplying seeds and have not tried to acquire large tracts of land for their biocrops (Kamanga, 2008).

As indicated in a 2009 IIED report, investors had requested land for biofuel production amounting to as much as 4 million hectares - 640,000 hectares of which has already been allocated and only about 100,000 hectares had been fully secured by investors (Sulle and Nelson, 2009b).

Prospective investors have proposed biofuel initiatives for the production of biomass for either bioethanol or biodiesel with capital outlays ranging from $60 million US to $1.5 billion US (Kamanga, 2008; Sulle and Nelson, 2009). Some companies have proposed biofuel projects involving an initial investment of almost $1 billion US to occur over the next 10-20 years; many include the production of large scale biofuel refineries (Sulle and Nelson, 2009). Few projects have been in operation very long, therefore the effects of production on the local economy, land tenure relations, and smallholders are yet to be determined.

3.4.1 Main Biofuel Crops

Currently, Jatropha is the biodiesel feedstock most preferred by companies in Tanzania with a few companies selecting palm, Croton megalocarpus and rapeseed. Sugarcane has been the feedstock most selected for the production of bioethanol. Other bioethanol feedstocks include sorghum, with some discussing the potential for cassava, millet, potatoes and sisal waste (Mwanila et al., 2009).

Oil palm, which is considered to have the highest yield per hectare, has been used as a food crop in the country since the 1920s (Songela and Mclean, 2008). It has primarily been cultivated by smallholder farmers in Kigoma Region, Mbeya Region and in some parts of Tanga Region. To develop large scale plantations requires high levels of capital investment. Hybrid palm oil trees generally take five years to produce, compared to local varieties which may take up to nine or ten years. To incorporate smallholders in the production, some investors have called for outgrower schemes, some of which involve intercropping palm tress with other crops (Sulle and Nelson, 2009). Recently, oil palm has been used for the production of biodiesel. Production facilities are reported to be of poor quality, with up to 60 percent oil loss (Sulle and Nelson, 2009). While some estimates indicate that 1.6 million hectares of potential land exists for oil palm cultivation, as of 2004 there were 4,500 hectares of land harvested (Sulle and Nelson, 2009). This suggests to investors that growing oil palm to produce biodiesel is a viable option, considering the land deemed available to its production. However, expansion of palm oil plantations for the production of biodiesel for export is hindered by the fact that Tanzania is a net importer of palm oil for cooking and therefore it is likely that any refined palm oil will be used for cooking rather than biofuels, at least domestically (Songela and Mclean, 2008).

Jatropha has been widely promoted as suitable for smallholder cultivation in developing countries, particularly in Africa where it originates. Some estimates indicate that over 60 percent of the biofuel investments in Tanzania are for Jatropha (Habib-Mintz, 2010). Commonly known as *Mbono Kaburi* in Swahili, it is the feedstock that has most attracted both local and foreign investors to the sector. Jatropha is considered to

grow well in a wide range of soils, with an annual minimum rainfall required for plants of between 550 to 600 mm. Further, it has potential to reach maturity in five years and can remain in production for 40-50 years (Kempf, 2007).

In Tanzania, the Jatropha tree has been used as a hedge, to exclude cattle from cultivated land, and as a marker for graves and boundaries. The sap is used as an antiseptic, but has not been widely sold on a commercial basis. Traditionally, the oily seeds have been used to make soap on a non-commercial basis. More recently, several NGOs have promoted soap making among women's groups to generate extra income (Sulle and Nelson, 2009).

Promoting the cultivation of Jatropha on a wide scale has generated debate over viability of the crop as a biofuel feedstock. Some argue that introducing a potentially invasive alien plant species into some areas may be potentially dangerous as it can displace or alter native species, or transmit disease and pathogens such as the cassava superlongation disease and the African Cassava mosaic virus (Mwanila et al., 2009). As Jatropha is a more labour-intensive crop, commercial plantations will spend more money in hired labour than bioethanol crops, such as sugar cane. According to the FAO (2010), producing Jatropha from estates rather than outgrowers costs 30 percent more, suggesting that integrating outgrowers into the Jatropha supply chains will be more economically attractive for investors. Early reports of Jatropha production in the country indicate that the cops requires inputs such as nutrients, water and farm management, thereby competing with other cops (Massemaker, 2008). Expected revenues from Jatropha differ substantially according to the source but pilot projects have had far below expected yields and incomes (Mutch, Feb. 15, 2010).

Sugarcane is one of the largest commercial crops in Tanzania. It is considered to be one of the most favourable feedstocks for large scale ethanol production and has the potential to provide the highest yield of ethanol per area harvested (Hellin et al., 2008). It is primarily grown in the Morogoro, Kagera and Kilombero districts of the country on four estates: Kilombero Sugar Company, Mtibwa Sugar Estate, Tanganyika Planting Company and Kagera Sugar Limited (WWF, 2009) by large scale irrigated plantations and by smallholders under contract farming (Sulle and Nelson, 2009). Like oil palm, sugarcane has been an attractive option for biofuel investors. However, current production does not meet domestic demand (reaching only 64 percent), and this has resulted in importation (Sulle, 2009).

There has been widespread speculation and debate about the use of other feedstocks that have not yet been established. There is potential for the production of biodiesel from other existing oil food crops such as sunflower, coconut and avocado and for the production of bioethanol from crops such as cassava and sisal, but no such projects have yet been established (Sulle and Nelson, 2009). Sisal estates produce between 20,000 to 40,000 tons of sisal 'fibres,' constituting approximately 4 percent of the leaf, the remaining consisting of biomass and juice. However, the process of transforming the waste to ethanol is currently costly as sisal sugar is difficult to hydrolyse and further research is required to improve the technology (Mwanila et al., 2009).

Croton megalocarpus is a canopy forest tree widespread in the mountains of the Arusha, Kilimanjaro and Kagera region, that can grow to heights of 40 metres or more (WWF, 2009). The seeds are reported to contain 32 percent oil (WWF, 2009) and yield a clean vegetable oil for clean biodiesel fuel (Jan 26, 2009). Trees are currently not being

cultivated, but a few companies are in the process of acquiring the land and capital to begin. Sweet sorghum has also been promoted as a potential biocrop with at least one investor planning to produce the feedstock. Grown in almost every region of the country, it is a highly resistant crop and thought to have great potential to be grown for biofuels, though it has not yet been grown on a commercial scale (WWF, 2009).

3.4.2 Production Models

Three production models exist in Tanzania for cultivation of biofuels. Large scale production occurs among biofuel investors which control both the production and processing of the crop. Small scale production comprises both contract farmers operating under outgrower schemes or working in cooperatives or as independent suppliers, though information on smallholders producing biofuels independently is not currently available. In the outgrower schemes that have developed, the company depends entirely on the production of local farmers contracted to grow the crop and sell the products to the company. Farmers are allowed to retain rights to the land and grow other crops through intercropping, but are bound to the terms agreed upon by the contract. The hybrid model combines production from both large scale plantations and small scale farmers (Sulle and Nelson, 2009). The production systems selected have been based on the crop, the market the crop is serving (either domestic or international), the type of production system already used to produce the crop and the expected profits.

Plantation Model

The plantation (alternatively called estate) model of biofuel production has been most preferred among the companies investing, or interested in investing, in production on a large scale. Investors leading plantation development in the country include SEKAB BT, Bioshape, Farming for Energy for Better Livelihoods in Southern Africa (FELISA) and Sun Biofuels (Sulle and Nelson, 2009; WWF, 2009). The plantation provides a measure of financial security and may be used as collateral for obtaining a bank loan at various phases of the project, not just when it is fully established. Investors themselves typically indicate the plantation model provides reliability of feedstock supply, quality can be more easily controlled and marketing of the product is more easily facilitated. While some investors have announced an intention to integrate contract farmers into future plans, others have been discouraged from doing so as a result of low population densities, and a "lack of established local capacity" for agricultural production (Sulle and Nelson, 2009). Profits can be more easily assured through investing in large scale plantations depending on the crop, and particularly for bioethanol (Sulle and Nelson, 2009).

Contract Farmers and Independent Suppliers

Since they represent the majority of the agricultural producers in the country, the smallholder population is most affected by biofuel investments – either through involvement in contractual farming arrangements or through investor allocation of land previously used by villagers. Outgrower or contract schemes are quite common in the country and have been used for crops such as palm oil, sugarcane and sunflowers.

Farmers have entered into contractual relationships with processors to grow produce under specified conditions throughout the country. Many companies have generally preferred to not use outgrowers, at least initially. The smallholder sector in the country depends heavily on rain and subsidised fertilisers that are not always available, and extension support is often difficult to obtain. The quality of the produce of smallholders, therefore, cannot easily meet market requirements, deterring some investors from using outgrowers (Mwanila et al., 2009). Currently, the two main biofuel companies operating solely through contract suppliers are Prokon and Diligent.

Hybrid Model

Companies looking to invest in biofuel production in the country typically will either produce biofuels on large estates or work with smallholders through production contracts. Preferring to have control over the levels of production, supply quality and price, investors typically have chosen to work through estates, but have been dissuaded by the lengthy acquisition process. Some investors, therefore, choose to incorporate both models of production. SEKAB's proposed project to develop sugarcane in Rufiji and Bagamoyo expects to use both a plantations model of production and outgrowers. The company has proposed the idea of block farming where rather than growing sugarcane on separate plots of land, farmers would grow the crops in a block of farms, each approximately 25 hectares (Sulle and Nelson, 2009).

Projects are also categorized according to size of operation. Much of the literature only makes the distinction between small and large scale projects, while Martin goes further and divides the operations into four categories: micro, small, medium and large.[11]

Small scale/Micro scale

The smallest biofuel projects (approximately 200 hectares and less) have been initiated to satisfy local energy demands and to provide alternatives to environmentally damaging biomass, particularly for cooking and have, for the most part, involved Jatropha. Some of these initiatives have been in operation since the 1990s (Martin et al., 2009). Most projects have involved outgrower schemes – the terms of such agreements still remain largely undisclosed and comprise only a minority of the projects in operation (Martin et al., 2009).

Many projects have been initiated or planned throughout the country to encourage the cultivation of Jatropha on 'marginal' lands. Most of these projects have been implemented through or with local NGOs. Most of these small scale projects have grown Jatropha, with the average yield falling below expectations (see Mitchell, 2008; Loos, 2008; Caniels and Romijn, 2009). Caniels and Romijn (2009) maintain that estimations of Jatropha's potential yields, of 5 to 10 hectares per year were unrealistic, demonstrating the underdevelopment of the sector in 2005 when enthusiasm for Jatropha production was highest.

[11] Micro: less than 200 hectares, no expectations to expand market; small: 200-2000 hectares, intercropping with current farm crops, plans for expansion; medium; ranging from 2000-50,000 hectares, outgrower schemes, purchase of biodiesel production equipment; large scale: large/several plantations exceeding 50,000 hectares, industrial production, plans to export abroad (Martin et al., 2009)

Table 4: Small Scale Biofuel Investors in Tanzania

Company/Organisation	Type of operation	Formation date in TZ and phase of operation	Location	Land area acquired (hectares)	Future plans
Kampuni ya Kusambaza Teknolojia Limited (KAKUTE): *non-profit company based in Arusha*	Piloting projects focusing on the production, processing and use of Jatropha	(2000)	Monduli; Arumeru Districts, Manyara Region		Focusing on cogeneration and all the potential market chains for oil crops
Jatropha Products Tanzania Limited (JPTL): non-profit company based in Arusha	Developing knowledge, skills, information and technologies for small-holders and SMEs about Jatropha	(2005)	5 regions		
The Tanzania Traditional Energy and Environment Development Organisation (TaTEDO): local NGO based in Dar es Salaam	Sensitising rural and urban communities on the potential use of Jatropha; providing information and extension services to smallholders	(1990)	10 regions	50	

Sources : Kamanga, 2008; Sulle and Nelson, 2009; Songela, 2008; WWF, 2009, Habib-Mintz, 2010; company websites

Medium/Large Scale

A majority of the biofuel initiatives submitted to the TIC for approval or in operation have been medium scale. Some of these projects have started to establish a biofuel market, but most are in initial stages (Martin et al., 2009). While biofuel producers of this size have not yet begun to produce liquid biofuels, they generally convert their fleet to run on Jatropha oil (or SVO). These operations generally focus on collecting Jatropha seeds from small scale intercropped farms to produce oil for biodiesel (Martin et al., 2009).

Large scale initiatives, on the other hand, have been initiated by foreign investors, predominately from Europe. Companies have expressed commitment to serving local and regional demand for fuels as well, but thus far, investment patterns are not clear, with

many speculating companies promoting more lucrative export production over fulfilling local demand for alternative fuels.

There has been growing interest from biofuel investors in Tanzania interested in producing biofuel on large scale plantations to supply bioenergy for global markets. While many of these initiatives are in the planning stage, awaiting approval for land acquisition or financing, there are a couple that have begun to produce biofuels for export markets. Plans for expansion and projected output have been ambitious. However, the moratorium on new biofuel investment pending development of a biofuel policy framework means that it is unlikely that biofuels will be produced on a large scale for export in the near future.

Table 5: Large Scale Biofuel Investors in Tanzania

Company/ Country of origin	**Type of operation**	**Formation date of company in TZ and Phase of operation**	**Location**	**Land area acquired (hectares)**	**Future plans**	**Previous Ownership**
Diligent: *Netherlands*	Jatropha production and processing of Jatropha oil	Producing and selling fuel in Tanzania; Contracts with over 5000 farmers	Arusha; Babati; Handeni; Singida; Monduli Districts	Farmers planted about 3,500 as of 2009	Produce SJO or biodiesel for the export market in Europe	
Africa Biofuel and Emission Reduction Company (Tanzania) Ltd*: Joint venture between* TTT-WILMA Biofuel (US) and Emission Reduction Company (Tanzania)	Biodiesel production from *croton megalocarpus*	(2007) No operational progress due to lack of funds; World Bank provided funding of $200,000 US	Biharamulo District, Kagera Region	20,000	Work with independent growers	General Land
Donesta Ltd	Biodiesel	(2007)		2000	Export	

and Savannah Biofuels Ltd.: *Tanzania*	production from sunflower and Jatropha	200 hectares of sunflower planted				
Farming for Energy for better Livelihoods in Southern Africa (FELISA): *Tanzania/Belgium*	Biodiesel production from oil palm and edible oil	(2004) Plan to produce 5,000 ha estate and 5,000 ha outgrowers	Kigoma Region	Kigoma 1: 4258; Kigoma 2: 350	Land targeted: 10,000 ha Estimated production: 40 million litres of palm oil per year; improving oil palm varieties	Kigoma 1: General Land Kigoma 2: Village Land
Bioshape: *Netherlands (fully foreign owned and equity financed)*	Biodiesel production from Jatropha	(2006) 400 ha pilot farm planted	Kilwa district	34,736 (50 year lease)	Expand to 81,000 hectares; Export to Europe	Village Land
InfEnergy: *UK*	Oil palm and food crop production	(2005)	Kilombero	7,500	Potentially produce biodiesel	Parastatal
BioMassive: *Sweden*	Biodiesel production from Jatropha and Pongamia	(2006)	Lindi district	55,000 (66 year lease)		
Prokon BV (Prokon Renewable Energy Solutions and Systems Ltd.): *Germany*	Plant oil and biodiesel production from Jatropha and rapeseed	(2005) Contracts with 2000 farmers	Mpanda District, Rukwa Region	Cultivates on 10,000	Export	
Sun Biofuels Tanzania Ltd: *Local affiliate of UK-based investment company (Sun biofuels owns 88% stake)*	Biodiesel production from Jatropha	Received final authorization to begin project June 2009 following EIA	Kisarawe District	Acquired 8,211 from 11 villages (99 year lease)	Expand to 85,000 acres; export	Village Land
Kikuletwa Farm: *owned by British Farmer*	Oil production from Jatropha and Aloe vera	(2004) Growing Jatropha	Kikuletwa; Moshi Districts	400	Expand to 1000 acres; local consumption and export	

CAMS Agri-energy Group Tanzania: *local subsidiary of CAMS Energy UK*	Sweet sorghum	Land request approved but asked to do land use plans	Bagamoyo; Hadeni Districts	40,000-45,000	Contract between 40,000 and 60,000 farmers	General Land
SEKBAB: Sweden	Sugar cane	Project halted	Bagamoyo District	22,500	Develop hybrid production system	Governmen t of Zanzibar
	Sugar cane	Land acqusition process halted	Rufiji District		Acquire 400,000-500,000;	General Land/Villa ge Land
Africa Green Oils	Oil palm	Planted 360 hectares	Rufiji District	860 acquired	Financing land use plans in 7 villages	
East Africa Biodiesel: private limited company registered in Tanzania owned and operated by a Kenyan of Indian decent	Jatropha	(2008) 2246 farmers have registered for participation in an outgrower operation	Bahi District	6000 in 6 villages	Seeking 40,000 hectares of land	

Sources : Kamanga, 2008; Sulle and Nelson, 2009; Songela, 2008; WWF, 2009, Mwanila et al., 2009; company websites

3.4.3 Major Biofuel Investors

Many foreign and local companies have initiated trials on biofuel production (Mwanila et al., 2009). The major companies currently operating in the sector in Tanzania are highlighted in this section.

Sun Biofuels Tanzania Ltd.

Sun Biofuels Tanzania Ltd. is a subsidiary of the British company Sun Biofuels UK, which operates predominately in emerging economies. In Tanzania, the company

intends to be involved in all areas of the industry from growing biocrops to processing and marketing.

The company has accumulated land for the production of Jatropha in the Kisarawe district. The acquisition process was initiated in 2006 and was completed in March 2010. The company acquired 8,211 hectares from 11 villages that allocated the land with the approval of the village assembly. The district measures 353,500 hectares of which 30,900 hectares are arable and approximately 83,645 hectares are under cultivation (Kisarawe District, 2007 in Habib-Moltz, 2010). In total, the project is expected to affect 11,000 people living in villages surrounding the land, which provides a major source of income for villagers through resources such as firewood, food, clay for pottery and medicine.

The company currently employs a plantation model of production, but has expressed interest in using outgrowers in the future. One source indicates workers are to be paid an estimated $3 US per day (Beattie, 2008). The company, however, claims that it intends to pay workers $1095 US per year for farming and harvesting and would devote an additional five percent of its budget towards "social infrastructure" although no specific details or timeline were provided (Biofuels Digest, April 2, 2010).

Sun Biofuels relies on rhetoric of social responsibility, declaring that they are "committed to sustainable development with the countries [where they] operate; [they] strive to create minimal impact on the environment while bringing a high level of employment to what are often disadvantaged communities" (Sun Biofuels website as cited in WWF, 2009). The land deal, however, has generated a great deal of controversy and public criticism over the process through which the land was acquired, the impact of

the estate on the local population and the environment, and compensation for lost land. Villagers have claimed they were not consulted, compensation was inadequate and only paid to a fraction of households affected by the massive deforestation that has resulted. Initially reluctant to offer their land, villagers were allegedly convinced by their Member of Parliament who made promises to villagers that employment would be created and infrastructural development would take place (Mwanila et al., 2009). Some villagers have claimed that allowances were paid to village leaders to approve the leasing agreement. Though the project is still in its initial stages, the company has not yet provided the infrastructural development it had promised, such as roads, schools and hospitals (Sulle, 2009; wa Simbeye, March 15, 2010; Mwanila et al., 2009). The Village Council had elicited a verbal agreement that the investor would ensure that the biofuels production would not affect biodiversity in the region, but no guarantee was stipulated in the contract (Mwanila et al., 2009). During the land valuation process to determine rates of compensation, only the value of the planted trees was estimated and not the value of the land being dispossessed (Envirocare, 2008). The maximum amount to be paid was a one-time average payment of $223 US per household. The company has earmarked $632,411 US and has indicated it will compensate 2840 households, according to the district Land Officer. As of March 2010, many people had not yet been compensated. A district Agricultural Officer indicated that the lease should be worth an estimated $570 US per hectare, whereas Kisarawe villages were only compensated $77 US per hectare (Habib-Mintz, 2010).

The village of Muhaga yielded control of over 1000 hectares through transferring Village Land to General status. Sun Biofuels informed Muhaga residents that passing

through the area of land now in the company's possession would be considered trespassing as of March 15, 2010. Therefore, villagers lost access to precious land and forest resources. The letter sent to village authorities states that the company will be "compelled to use force to arrest and evict anyone within the area of its jurisdiction" (Letter dated 24 February, 2010 signed by acting Human Resources Officer M. Tembo, as quoted in wa Simbeye, March 15, 2010).

CAMS Energy Tanzania

CAMS Agri-Energy Tanzania is a UK-based trading company specialising in power and energy projects and agricultural projects. Land acquisition had been approved for production of sweet sorghum as of August 2009 and is to operate in eight villages, but production has not yet commenced. Early reports suggest that the land is currently not being used for food production, and that much is covered by brush. The company ambitiously plans to develop an outgrower scheme, which for every hectare purchased from the community, would entail equivalent sized sweet sorghum outgrowers plantation to be set up. The company intends to undertake bush clearing as well as provide seeds and chemicals such as fertiliser and herbicides and establish an irrigation facility and extension services (WWF, 2009). The company is piloting a project to produce ethanol and power from sweet sorghum, through long leasing of agricultural land. It plans to produce 10,000 tons (ten million litres) of ethanol per harvest of which it intends to dedicate 80 percent for rural electrification (Reuters, Sept. 22, 2008). According to a WWF study, the company has acquired 40,000 hectares, but the company claims it has acquired 45,000 hectares.

Bioshape

Bioshape was founded in the Netherlands in the late 1990s to produce biofuels in Tanzania for the Dutch and Belgian energy markets (according to the company website). The company started operating in Tanzania in 2007 and has acquired a 50 year lease of formerly Village Land to develop a large scale Jatropha plantation for the production of biodiesel. The company indicates that it has accumulated 81,000 hectares of land (Bioshape website) while land officials say they processed only 34,736 hectares as of May 2009 (Sulle and Nelson, 2009). The company plans to establish 400 plantations of 200 hectares each and maintain a buffer zone of natural vegetation, hills, wetlands and forest (company website). As of March 2009, the company has developed a trial Jatropha farm of 400 hectares (Sulle and Nelson).

Bioshape's presence in the country has so far been beset with controversy and problems. The company's EIA was considered inadequate by conservationalists as the assessment failed to recognize that the project falls within the Coastal Forest biodiversity hotspot, composed mainly of Miombo Woodlands. Land acquired was comprised of fertile forest celled the Namatimbile, which is the largest coastal forest in East Africa and home to endemic animals and plants (Mwanila et al., 2009).

The company contended that the land obtained was unused land. However, the Village Land Use Plan indicated that the land was farming area (Caniels and Romijn, 2009). Compensation payments were considered low (15,000 Tsh per acre – $12.09 US) and one village had charged that they did not receive any compensation. Although

typically compensation is paid directly to the village, in this case 40 percent went to the village with the remaining 60 percent to the district, purportedly for administration costs and development of social services in the district (Mwanila et al., 2009) This practice has been heavily criticized as it is the villagers that have lost access to land and require direct compensation not the district. Some opponents of the project have further charged that the land was not acquired legally (Mwanila et al., 2009).

Like Sun Biofuels, the company has vowed to provide a number of employment opportunities and infrastructural development projects, such as roads, schools and wells. The company plans to employ 10,000 people over the next 10 years; as of 2009, Bioshape employed 600 people, of which the majority were not permanent (Mwanila et al., 2009), paid approximately 200 Tsh ($2 US) per day (Envirocare, 2008).

At least for the first few years of the project the company planned to export the raw material to the Netherlands and Belgium, with the company making no firm commitment to construct a processing plant in the district (WWF, 2009). Reports emerging in 2009, however, indicate that the firm has financial problems. Amidst increasing controversy, one of the investors withdrew, leaving the firm with cash flow issues. While Bioshape has not withdrawn from the country it may be forced to reorient operations and manage delays (Caniels and Romijn, 2009).

SEKAB

SEKAB is owned by the SEKAB Group Sweden and was formed following the signing of a MoU between the Government of Tanzania and the Swedish Ethanol Chemistry (SEKAB), BioAlcohol Fuel Foundation (BAFF), and Community Finance

Company (CFC) (WWF, 2009). As of 2009, the company had acquired 22,500 hectares in Bagamoyo: seed cane was planted and an irrigation reservoir was constructed. This land was obtained from the Government of Zanzibar, which acquired the land in the mid 1970s to operate a cattle ranch (WWF, 2009). The company plans to operate using 90 percent estate, and 10 percent outgrowers or block farming.

Critics have been outspoken over construction of the estate in Bagamoyo; although classified as barren, the area has been a habitat for wildlife and a source of timber and non-timber resources for villagers. As the company has acquired General as opposed to Village Land,[12] the farmers using the land were expected to move and are not eligible for any compensation. Use of chemical fertilisers and pesticides in the plantations is considered likely to cause water pollution, particularly where investors had planned to use river water for irrigation (Mwanila et al., 2009). The company was also accused of doctoring its EIA report after the Swedish consultancy firm responsible for conducting the assessment publicly opposed the planned project.

The company was in the process of acquiring approximately 400,000 hectares of land in Rufiji as well, much of it falling under village control (Sulle and Nelson, 2009). The land negotiation process was also beset with controversy and came under heavy criticism. The investor proposed to lease land from some villages in the district that would result in the loss of most of the land and resources in the village. The Rufiji District Land Use Committee ascertained that some villagers had given up almost all village land to the investor (Sulle and Nelson, 2009). In the village of Utenge, for example, the village had agreed to give SEKAB 72% of its Village Land (Sulle and Nelson, 2009). Villagers were made were made verbal promises of social expenditure and

[12] The concept of Village and General land will be explained below.

employment, details which were not included in the contract. The land deal, however, has not been finalised as the status of the company in Tanzania is unclear.

In October 2009, EcoDevelopment took over 100 percent of the shares in SEKAB's two subsidiaries, SEKAB Bioenergy Tanzania Ltd and *Ecoenergia Mocambique,* as owners in Sweden ceased the flow of money into the country. The company has since been trying to procure aid from Norway and Sweden to continue operations, but the status of the project is unknown. It has also requested that the Government of Tanzania endorse the new ownership and become a shareholder in the local company. The government identified the Tanzania Petroleum Development Corporation (TPDC) as a company most able to become a SEKAB shareholder. An agreement was signed between the TPDC and SEKAB, which apportioned a shareholding of 10 percent to TPDC in August 2009. As of February 2010, the government was looking into providing a credit enhancement guarantee to SEKAB allowing the company to start up the Bagamoyo Project by mid 2010, which is a delay of one year (Kahoho, Feb 5, 2010).

Diligent

Diligent is a Dutch company, which has operated in Tanzania, buying and processing Jatropha seeds through contract farmers, since 2005. As of 2009, it was working with 4000 contract farmers, most of whom were planting Jatropha as hedges, in combination with other crops, on contours and degraded land (Sulle and Nelson, 2009). According to Sulle and Nelson (2009), farmers interviewed showed little interest in

planting Jatropha on areas already used to grow crops since Jatropha oil seeds have garnered lower prices than other cash food crops thus far.

Contracted and non-contracted farmers are able to sell their seeds for a minimum price of $0.09 US per kg (Tsh 100) according to one source (Wahl et al., 2009), or 150 Tsh per kg according to another source (WWF, 2009) over 10 years. Diligent buys seeds from middlemen who set up collection points in central areas such as marketplaces. The company has been praised for offering a minimum guarantee and allowing farmers to sell seed elsewhere, which is not common in the industry in Tanzania. However, the price that farmers receive is still quite low.

The company is considered to be the most important player in the Tanzanian biofuel market, small as it is in its initial stages (WWF, 2009; Sulle and Nelson, 2009). The company has spearheaded much of the research into the expansion of Jatropha and currently is a leading producer of biofuels in the country. According to latest figures, it produces a capacity of 1500 litres per day, though most of this is Jatropha oil, rather than biodiesel (WWF, 2009).

As the government has not developed a biofuel taxation policy, the taxes are included in the fuel price of 2000 Tsh/L (Wahl et al., 2009). The company also runs four mechanical oil expellers and a small biodiesel refinery plant. Further, Diligent is one of the few investors that have already been producing oil for biofuels in the country. As of 2008, estimates of Jatropha oil output were 600-800 litres per month out of a total installed capacity of 1,500 litres per month (WWF, 2009).

While the company argues that its outgrower model avoids the environmental problems and land disputes that large scale production has created, it admits that the

production of Jatropha has not yet been very profitable for small farmers, with 5kg of Jatropha yielding approximately 1 litre of oil (Mutch, Feb. 15, 2010).

Prokon

Prokon Tanzania is a local subsidiary of a German company and has been developing a Jatropha production and processing chain since 2005. It produces Jatropha through contract arrangements, involving approximately 2000 smallholders in Mpanda district (Sulle and Nelson, 2009). The contract between the farmer and the company stipulates that the farmer is to provide Jatropha seeds exclusively to Prokon for 10 years in exchange for a guaranteed price of 300 Tsh per kg of seeds according to the company (WWF, 2009), or 200 Tsh per kg according to another source (Loos, 2008). The seeds are processed in an oil mill, and then used for transport and rural electrification (Loos, 2008). According to the company, extension officers and agronomists working through the company provide support in Jatropha management, extension services and support with pesticides to contracted farmers. In some cases, the company has indicated it has provided subsidized land preparation and a small start up loan for producers, the specific details of which are unknown (Loos, 2008). The company has established Jatropha nurseries across the district and promoted Jatropha production among farmers through the provision of free seedlings (Prokon, October 2009).

The district has been considered a prime location for Jatropha cultivation as it is remote and fuel prices are higher in the region and therefore Jatropha oil is more competitive. But because of its remote location, the company has fewer connections with

the government and has been less susceptible to government policy as a result of the slow diffusion of information to the area (Roks and van Vlimmerman, 2008).

According to a 2009 figure from the IIED, 10,000 hectares of Jatropha is under cultivation (Sulle and Nelson, 2009), while Prokon estimated in 2008 that 12,000 hectares have been cultivated with the crop in Mpanda (Prokon, Loos, 2008). In order to obtain land for Jatropha production, farmers have been clearing the forests in the district. The oil produced from the Jatropha seeds are to be sold to Germany and to the Tanzania Electricity Supply Company (TANESCO) (Envirocare, 2008).

FELISA (Farming for Energy for better Livelihoods in Southern Africa)

FELISA Ltd is a Tanzanian-Belgian company, mostly financed by Belgian shareholders, which has obtained 4,608 hectares of land in the Kogoma Region. It has developed a project to produce hybrid oil palm production, with approximately half of production projected to come from smallholder outgrowers with the other half from a plantation (Sulle and Nelson, 2009). (Sulle and Nelson, 2009).

FELISA works with 36 registered groups of farmers numbering from 20 to 40 per group (Sulle and Nelson, 2009). Each group works with the company in accordance with a written constitution. The company has developed new palm seed varieties for farmers to produce with "new spacing and other agronomic practices (Sulle and Nelson, 2009)." It has promised to contribute to village infrastructural projects and has agreed to help the village obtain high-yielding varieties of oil palm seeds from its company gardens but no written agreement has been signed binding the company to fulfil promises made to the villagers (Sulle and Nelson, 2009).

The company has been embroiled in a land dispute over 350 hectares of land obtained from two villages (Kalago and Basanza) in Kogoma Rural District. Village Assemblies approved the agreements for the transfer of land after negotiations with the Village Councils and District authorities. However, before the deal was to be finalised, Klrago village informed the district that the land had already been allocated to another investor, a resident of the district, who apparently had been allotted the land not in accordance with proper procedure. As of March 2009, the dispute was in court (Sulle and Nelson, 2009; Mwanila et al., 2009).

Local small scale initiatives

There are various local and international NGOs and CBOs that have developed projects focusing on rural electrification or income generation involving the production of Jatropha. These have included local women's groups such as Wodsta and Social Services, HIMAWAMO (*Hifadhi Mazingira Wanawake Monduli*) and Environmental Association (SSEA), a producer cooperative called Green Garden Women's Group (GGWG), and a church based development project called KIUMA, which intend to produce electricity using Jatropha oil (Roks and van Vlimmerman, 2008). Many groups have created test plots for the production of Jatropha, some of which is contingent on short-term funding. Scant information is available on the relative success or failure of the project.

Faida Mali, an NGO that helps facilitate market access for the poor, has provided technical support and training, while the investment company DOSI (*Dutch Stichting het Groenewoudt*) and the Tanzanian Massai NGO IOPA (Institute for Orkornerei

Pastoralists Advancement) have entered into a joint venture. They own four diesel powered mill processing factories, and intend to build a fifth to be blended with Jatropha oil and grow an additional 1000 hectares to guarantee supply (Roks and van Vlimmerman, 2008). The company also plans to further process Jatropha seedcake into charcoal or biogas. DOSI has helped to set up the Energy and Water Company, which buys Jatropha from farmers and converts the plants to oil, biogas and organic material to be used as fuel for generators.

Many of these initiatives promote Jatropha production on a small scale basis to provide fuel for lamps and stoves, focus on the production of SVO, rather than biodiesel, or use Jatropha for soap making or medicinal gel for repelling mosquitoes (Roks and van Vlimmerman). Two local NGOs, TaTEDO and KAKUTE have focused on educating local communities on the importance of developing simple technologies to generate energy.

KAKUTE

KAKUTE (Kampuni ya Kusambaza Teknolojia - The Technology Extension Company Ltd.) is a Tanzanian consulting firm, founded in 1995, that is involved in the processing and marketing of oil crops. In the biofuels sector, it has principally worked to assist smallholders in producing Jatropha for oil and soap making. It was a pioneer in the expansion of Jatropha production in the country when it initiated projects in 1998 in the Arusha region (Roks and van Vlimmerman, 2009). It operated a project which promoted Jatropha as a source of income for rural women by establishing Jatropha nurseries, developing ram presses and soap making facilities and using Jatropha for oil lamps and

cooking stoves, which was sponsored by the McKnight Foundation, the Heifer Project and UNDP in cooperation with other actors such as TaTEDO. While it had previously been involved in producing and selling Jatropha, with the cessation of funding, it now focuses mainly on training, workshops and knowledge transfer (Wahl et al., 2009).

TaTEDO

Tanzania Traditional Energy Development and Environment Organisation (TaTEDO) is a sustainable energy NGO based in Dar es Salaam, which has been involved in energy promotion activities since 1992. It works in partnership with local and international NGOs as well as government authorities, the private sector and communities. The organisation currently promotes Jatropha cultivation in 10 regions and has promoted the development of biofuels since 2003 through conducting research on biofuels and providing support for small farmers (TaTEDO website). The objective of the organisation is to improve the lives of beneficiaries through reducing energy costs and providing alternative sources of energy, which are more sustainable and efficient. The organisation has been involved in projects to decentralise rural electrification through biofuels, promoting small scale production for domestic energy needs rather than for export. In collaboration with the Norwegian Agency for Development Cooperation (NORAD), the organisation developed a pilot project using a Jatropha fuelled generator in a multi-functional platforms (MFP)[13] to deliver power and services to a couple villages in the north of the country (Roks and van Vlimmerman, 2008).

[13] The concept and structure of the MFP was developed by UNDP and has been deployed in a number of West African countries as well as Tanzania and Zambia. It is built around a simple diesel engine, which also runs off pure Jatropha oil and can be used to power various tools such as a cereal mill, alternator, pump, husker, etc. It can also be used to generate electricity and distribute water.

Table 6: Undisclosed Biofuel Projects in Tanzania[14]

Company	Type of operation	Phase of operation	Location	Land area acquired (hectares)	Future Plans
Kotomondo Ltd	Biodiesel plantation		Bagamoyo District, Coast Region (Makurunge Farm)	2,000	
Donester: *Canada*	Oil production from Jatropha		Manchari; Banyibabyi; Dodoma; and Chalinze, Coast Region	100 acres	Planning to establish Jatropha demonstration farm for oil production
JKT: *Tanzania*	Jatropha production and training		Oljoro (100 acres), Mgambo (100 acres), Chita (100 acres), Maramba JKT (100 acres) Mlale JKT (50 acres), na Ruvu JKT (500 acres)		
AMMA (Amsha Mabadiliko ya Maendeleo Africa)	Jatropha production and awareness		Lushoto, Kagera, Kateshi, Pemba, Lindi, Mtwara, Tanga, Iringa, Dodoma, Singida, Shinyanga, and Ruvuma		
Mkamba Forest and Wildlife conservation Group (MFWC G)					
Tanzania Green	Jatropha production	Planning phase			Planning to produce 1000 ha
Environmental and Economic Development					

[14] There is very little information available on the following projects either in government documents or reports on the biofuels sector in Tanzania. Most are in the initial stages of biofuels production and many may have since been cancelled or halted.

(EDEN)					
Social Services and Environmental Association (SSEA): *Women's group from Kinondoni*	Jatropha production	Planning phase	Kinondoni District		Planning to supply Jatropha seedlings to sell
Mbono		Planning phase			
USANGU Jatropha Project	Jatropha production	Planning phase	Usangu, Mbarali District		Planning to produce 100 ha
J&J Group (Pty) Ltd Pretoria: South Africa	Jatropha production		Tabora Region		
Luxevera Ltd		Planning phase	Shinyanga Region		
Sivas Africa Ltd: India/Tanzania	Biodiesel production		Dar es Salaam Region		
Mahenge	Jatropha production	Planning phase	Mahenge District		Planning to produce 100 ha
Ubumwe	Jatropha production	Planning phase	Kibondo District		
Tanzania Moringa Farmers Association (TAMOFA)	Jatropha production	Planning phase	Morogoro; Dar es Salaam Regions		Planning to produce 20 ha
Enviro- Fuel Technology: Tanzania/ British and South Africa					
TM Plantations Ltd: *Malaysia*	Oil palm production		Kigoma Region		
Arusha Cuttings: *Netherlands*	Jatropha production		Arusha Region		
Lovo *(South Africa) and* ***ACSL and CIEL Groups*** *(Mauritius)*	Sugar cane production				
Sithe Global Power, LLC: US	Oil palm refineries				
Abengoa Bioenergy	Sweet sorghum		Bagamoyo District		

Company: *Spain*	production				
Bioenergy Resources, Tanzania Limited	Biodiesel production from Jatropha		Coast; Morogoro Regions		
EUROT ECH: *Korea*	Castor oil, Jatropha	Planning phase			
Mitsubishi Corporation: *Japan*	Jatropha (farms and operating facilities)	Looking for land; in project formulation phase	Arusha; Dar es Salaam; Coast Regions		
Shell foundation and Doen Foundation	Buying/Collection and processing Jatropha seeds from farmers	Already producing and selling fuel Working with Diligent	Arusha; Manyara; Kilimanjaro; Singida Regions		Export to Europe; Obtain 100 tons of seeds to process to produce 1.5 million litres per year
Barrick Gold Mining Corporation *(UK)* ***and Export Trading Company Limited*** *(Tanzania)*	Jatropha production on land damaged by mining activities; Biodiesel plant produces biodiesel out of waste oils.	ETC has trained farmers to create plantations and sell their seeds to ETC	Shinyanga; Mara Regions	11 (ha) primarily used as a clone bank to support plans for outgrowers	Mara Project intended to produce Jatropha for the goldmine, Shinyanga project to be used locally to provide fuel for tractors and other working equipment
ZAGA	Jatropha	Applied for land	Kisarawe District		
Tanzania Biodiesel Plant Ltd	Oil palm	Land not surveyed; land granted by district but not by TIC	Bagamoyo District	16,000	Applied for 25,000 ha;
Shanta Estates Ltd	Jatropha	Agreement with villagers signed	Bagamoyo District	14,500	
Trinity Consultants Bioenergy TZ Ltd	Jatropha	Surveying land to be granted	Bagamoyo District	16,000	Expand to 30,000 ha
Matrix Poverty Eradication Foundation (MPEF)	Planning to establish Jatropha plantation	Planning phase	Kibaha District		

Sources: Kamanga, 2008; Sulle and Nelson, 2009; Songela, 2008; WWF, 2009; Roks and van Vlimmerman, 2008, company websites, Sumbi, 2009; MEM, 2008a

3.4.4 Obtaining Land for Biofuel Production

The biofuel land acquisition process in Tanzania has been replete with tensions, lack of public disclosure and conflict, arising, in part, from ambiguity in land laws. The biofuel issue has illuminated existing tensions over land use and land allocation between private, local and government actors. Land tenure in the country has been characterised by state control over rural lands, subject to conflict over customary versus private title to land (Shivji, 1998; Sundet, 2005).

The dual system of land tenure introduced through colonialism has largely been maintained. Historically, land was governed by the national government beginning with the 1923 Land Ordinance, which centralised land administration and allowed customary land rights to be subject to central government authority. Problems such as land scarcity, conflicts between farmers and pastoralists, tenure insecurity and land degradation became a problem in the context of an ongoing export crops bias and increasing demand for land from large scale mining and tourist companies (Tsikata, 2003). Increasingly, allegations have surfaced of widespread abuse by state agencies and demands for land reform have emerged from all sides. In response to widespread conflict and criticism of current land policies, the government enacted the Land Acts of 1999, which is comprised of two pieces of legislation: the Village Land Act which governs areas within villages and the Land Act, which governs all other areas in mainland Tanzania (Tsikata, 2003).

With the adoption of the Village Land Act in 2001, the President retained ownership of all lands as a trustee for Tanzanians, making land tenure a matter of usufruct rights as defined by various leasehold periods and conditions. Land rights are

based on use and occupation with the act stipulating that 'customary rights of occupancy' are equivalent to land occupancy that has been 'deemed' or 'granted' (URT, 1999b).

There are three basic categories of land in the country as established by the Land Act: (1) Reserve Land (2) Village Land (3) General Land. Reserved Land is area demarcated as national parks, game reserves, marine reserves, and forest reserves and comprises about 30-40 percent of land to be administered under a number of statutory bodies (Sulle and Nelson, 2009b). Village Land is administered by village councils, which answer to the Village Assembly, which is comprised of all adult residents in the village. General Land is area neither administered by the village nor set aside as Reserved Land. These lands are under the authority of the national government, administered by the Commissioner for Lands in the Ministry of Lands, Housing and Human Settlements Development (Sulle and Nelson, 2009).

There is some ambiguity around the categorisation of General Land. The Land Act refers to General Land as public land that is neither Reserved Land nor Village Land "and includes unoccupied or unused Village Land", which presents further confusion over land management, particularly during land transactions (s.2, URT, 1999a). This definition, according to Sundet (2005), allows for the transfer of 'surplus' land from villages to investors. Sundet further maintains that the Act allows power to be consolidated in the hands of the Commissioner of Lands, allowing him/her to regulate land use and ownership (2005). The Land Act calls for the establishment of Land Allocation Committees at the levels of local authorities "to advise the Commissioner on the exercise of his power to determine applications for rights of occupancy" (s.12, URT, 1999a). The committees, however, serve solely an advisory role, being subordinated to

the Central government and appointed ministries; the Act specifies that the Commissioner is not bound to the decisions formulated by the Land Allocation Committees (s. 26) (Sundet, 2005).

Despite the various categorisations of land and processes laid out for land transfer in the Land Acts, as the government retains the right to govern all lands, it has the legal right to appropriate Village Land and private individuals' land (Sulle and Nelson, 2009). Furthermore, the Village Land Act, in an attempt to protect customary land ownership and safeguard against improper manipulation of the system, has introduced a complex layer of legal stipulations to block abuse of the system. This complexity, Sundet (2005) argues, lends itself to exploitation and manipulation by those better informed and connected in the local environment.

When the village administers lands, investors negotiate with the local community to transfer land from Village to General Land status, requiring approval from the Village Council, the District Council Land Committee and the Village Assembly (Cotula, Vermeuelen et al., 2009). After acceptance of the land transfer to General status, compensation is to be paid according to provisions of the Village Land Act (Sulle and Nelson, 2009b).

There is no system in place to adjudicate when land acquisition is contested and therefore little protection for villagers attempting to retain access to lands. Investors also face risks in this process, in the event that the project is cancelled due to changes in political power or strong farmer resistance. Although the Land Act outlines procedures for the transference of land, in many cases, transfers diverge from government procedures. A government attaché is often sent to the villages to introduce the company

to the local governments. Habib-Mintz (2010) argues that in the case of Sun Biofuels, this influenced farmers' perceptions of the proposed investment.

Table 7: Biofuel Projects in Tanzania which have been Abandoned/Halted/Cancelled

Company	Location	Type of operation	Reason for project termination	Land area acquired (hectares)
JCJ Co. Ltd	Mwanza Mara Shinyanga Tabora	Sensitising local communities about Jatropha production	Alleged lack of government support	
Clean Power TZ ltd	Bagamoyo District	Oil palm	Project abandoned after realized high cost of doing land use plans	3,500
Kapunga Rice Project	Mbarali District, Mbeya	Replacing rice farms with Jatropha	Project abandoned and registration cancelled because president ordered that rice cultivation patterns not be changed	50,000
SEKAB: *Sweden/Tanzania Eindhoven-based company with branches in Tanzania and Columbia*	Wami River, Bagamoyo District	Sugarcane	Owners in Sweden ended flow of money into the country; Trying to procure aid from Norway and Sweden to continue operations	22,500 seed cane planted and irrigation reservoir constructed
BP and D1	Kilimanjaro	Biodiesel production from plant oil particularly *Jatropha curcus* and *Moringa oleifera* – export	Started in 2003, BP ceased operations in Tanzania	

Sources: Kamanga, 2008; Sulle and Nelson, 2009; Songela, 2008; WWF, 2009; D1 Oils company website; SEKAB company website

3.4.5 The Land Compensation Process

The compensation process has been beset with problems, inconsistencies and lack of transparency. Villagers are only eligible for compensation in cases where land was

formerly administered by the villages themselves. Communities relying on resources from General Lands are therefore not compensated when investors wrest control from the villagers for biofuel development. Before the transfer from Village to General Land is finalised and customary land rights are terminated, the villages, district officials and the Commissioner of Lands are to agree to a level of compensation to be paid to the villagers (Sulle and Nelson, 2009). According to public record, the process of compensating villagers for lost lands has not been followed, levels of compensation agreed on have often been much lower than the value of the land and compensation has in many cases not been completed on time or at all (Sulle and Nelson, 2009; Mwanila et al., 2009).

Compensation for Village Land is typically negotiated between the investors and the village, without the involvement of the central or district government, despite procedures outlined to the contrary in the Village Land Act. Investors have defended this approach by claiming that District Council staff "do not understand or respect the law, and are not accountable to villagers (Sullen and Nelson, 2009: 54)," maintaining that by directly dealing with villagers themselves they can ensure the process is 'efficient' and 'equitable' (Sulle and Nelson, 2009). Dealing with the villagers themselves is in fact more 'efficient' and does save time and effort for investors. The process, however, has not garnered 'equitable' results for villagers who are often unable to understand the entire process, agreeing to terms that are unclear and often different from what they were led to believe.

Offers of compensation do not take into account the loss of revenue accrued from the land. According to reports issued by the IIED, the WWF and Oxfam, compensation for land acquired in the Miombo woodland did not take into account commercial value of

the timber on the land, which was estimated to be approximately 35,000 Tsh ($28 US) per hectare per year (Sulle and Nelson, 2009). Compensation is also not generally paid until after land has been transferred to General Land and the company has received a derivative or granted title to the land from the TIC (Sulle and Nelson, 2009). An investor explained that the derivative title is required to secure a bank loan and therefore compensation cannot be distributed prior to that point (Sulle and Nelson, 2009).

Compensation is often only provided for the portion of land acquired that undergoes cultivation. Therefore, when companies acquire large tracts of land, and leave portions unutilized, no compensation is required (Mngazija, October 12, 2009). In the case of land acquired in Kigoma, compensation was promised for the palm trees on the land, but no value was attached to the land itself (Kamanga, 2008). Essentially, investors have been able to villagers strip villagers of their land while incurring very little costs for land compensation.

In Kisarawe district, 11 villages lost land in the transfer from Village to General Land when Sun Biofuels obtained the area for biofuel production. Because a large portion of the land obtained by the investor was bush/woodland, villagers were not entitled to receive compensation, according the Kisarawe District Land Officer (Sulle and Nelson, 2009). The company paid some compensation but according to villagers, levels were very low and many were promised compensation that was not received. For example, in Mtamba village, 11 compensation forms were brought but only one villager was compensated (Sulle and Nelson, 2009). The entire compensation process was not clearly described to villagers and many were confused and misled. In the Tanga Region, compensation procedures were not clearly understood by the villagers who trusted verbal

offers made by investors. This was compounded with the fact that villagers often do not know the precise size of their land and do not have maps indicating land boundaries, leading villagers to accept a request for land surpassing the size of land owned (Mwanila et al., 2009).

The existing process of land acquisition lacks transparency and accountability. Village Councils, District Councils and regional officers have not coordinated their activities; they often work in isolation. In the absence of by-laws or specific policies or procedures to guide land transfers, land has been given away "almost freely" (Mwanila et al., 2009).

Table 8: Compensation and Employment offered by Biofuel Investors in Tanzania

Company	Level of compensation agreed to	Compensation paid	Length of lease (years)	Investment	Planned Investments	Employment
Sun Biofuels	An average of $230 US per household and 2840 in total to be compensated - approximately $77 US per hectare	Not all villagers received promised compensation	99	Project valued at $20 million US	Plans to invest $20 million US on infrastructure (schools, roads, etc.)	400 employed; to employ 1100 more in next 4 years; company indicates workers to be paid $1095 US per year for farming and harvesting
Bioshape	15,000 Tsh (USD 12.09) per acre (40% to village, 60% to district): in total 405,109,600 Tsh ($315,211 US) to compensate four affected villages for the 34,000 ha acquired	Reports that not all land compensated for	50	Made verbal promises to invest in social infrastructure (roads, schools, wells, etc)	Plans to establish biodiesel factory to produce 45,000 tons of vegetable oil and generate 25 megawatts per year and employ 50 people; plans to employ 10,000 in 10	Employing 600 (most temporary) employees; Workers reportedly paid $2 US/day

					years	
Diligent						200 seed collectors in Northern Tanzania
SEKAB	Approximately 14 households and some pastoralists to be compensated			Bangamoyo project valued at US $500 million US	Crushing of sugarcane is expected to begin in mid 2010 with 700, 00 tons of raw material to produce 65,000 tons of sugar and 25,000 cubic litres of ethanol	Projected: one million new direct and indirect jobs; 90% estate; 10% outgrowers or block farming

Sources: Kamanga, 2008; Sulle and Nelson, 2009; Songela, 2008; WWF, 2009; Envirocare, 2008; Kahoho, Feb. 5, 2010

3.4.6 Land Used for Production

Much of the land earmarked for biofuel production is located in five regions of Tanzania: Dar es Salaam, Coast, Tanga, Mbeya and Arusha. The land targeted for large scale production has generally been characterised by high rainfall, water resources and is generally densely populated. Major investors such as SEKAB, InfEnergy, Bioshape, BioMassive and African Green Oil have invested along the coast in Bagamoyo, Rufiji, Lindi and Morogoro Districts and have intensions to export fuels (Mwanila et al., 2009). Smaller projects, aimed at self-sufficient production have been occurring further inland on more marginal land (Sulle and Nelson, 2009).

Land available for the production of biofuels is not as plentiful as portrayed. Estimates of land availability as promoted by biofuel investors, the Tanzanian government and the TIC, are generally exaggerated, not only from the standpoint of area of arable land in the country, as discussed in section 3.3.2, but also the amount of

underutilized or unowned land available. It is likely, therefore, that land disputes will continue as investors infiltrate more areas of the country.

Part of the appeal of biofuels is the claim that production can occur on marginal, unused lands. However, much of the land that investors are in the process of obtaining for biofuel production is fertile land that is not permanently settled, but is certainly used by villagers (Kamaga, 2008). According to the WWF report, 90 percent of biofuel investments are using at least some land that is not 'marginal' (WWF, 2009). Requested or allocated land for biofuels also has included areas of prime natural vegetation such as the Eastern Miombo woodlands, located in the southern part of the country, coastal forest, wetlands and riverine forests (Mwamila et al., 2009). According to estimates from the World Bank (2008), informal and non-industrial uses of forest in the country can provide villagers with $35-50 US per month from food, medicinal products and charcoal; forests in the country provide approximately 75 percent of all building material, 95 percent of household energy supplies, and 100 percent of traditional medicines (Sulle and Nelson, 2009b).

Large scale biofuel allocations have also put large scale farms in direct competition with smallholders for water resources. With many large scale plantations set to be located adjacent to rivers which smallholders depend on for irrigation during the dry season, irrigation of large farm may cause conflict over water access (Mwanila et al., 2009).

3.4.7 Perceived Benefits of Biofuel Production

Employment

Most of the foreign investors attempting to acquire land for biofuel plantations have promised employment. Work has been created by large scale biofuel plantations and outrgrower schemes and additional jobs will be created by the need for seed distributors and other roles (WWF, 2009). In cases where the value of labour in the plantations is higher than in producers' own farms, some will likely choose to move to the plantations to sell their labour (Mwanila et al., 2009). This has occurred where Bioshape acquired 34,736 hectares and employed approximately 600 workers, most of whom are not permanent (WWF, 2009). The wages currently being provided to workers ($2 or $3 US per day, depending on the company) have generally been low. Further, much of the employment is temporary, for clearing and preparing the land and for construction as well as manual labour for attending plants. As operations expand and modernize, the level of employment is expected to decline (Habib-Mintz, 2010).

As crude oil in Dar es Salaam sells for approximately $0.52 US per litre, some have estimated that the cost of producing seeds will not exceed $0.16 US to allow for processing costs in order to be competitive with diesel. When factoring in infrastructural and other costs, a processor cannot afford to pay producers a high wage – instead only about 3 or 4 cents per kg of seed (WWF, 2009).

Value Addition

The potential for value addition through processing of biofuels is key to the biofuel debate in Tanzania. In order to promote both opportunities for increased income

and employment and serve domestic energy needs, the processing should be carried out in the country. According the WWF (2009), all biofuel companies expressed their intention to facilitate processing within Tanzania in the long-term. However, given technological and infrastructural constraints within the country, investors have strong impetus to promote an export-oriented model of production.

As indicated in Section 3.4.2, there are a number of small-scale projects developing technology to use SVO (or in the case of Jatropha, Straight Jatropha oil) in vehicles and stoves lamps. Processing SVO to diesel is, however, an extensive process with large quantities of energy and ethanol required (WWF, 2009). The biodiesel production process is also constrained by limited market accessibility to chemical inputs (such as methanol and sodium hydroxide), which contribute to its higher production costs (FAO, 2010). Tanzania's domestic fleet of automobiles are not compatible with biofuels since many are quite old. Further, plans to use biofuels to generate rural electricity have been constrained by the rural electricity grid, which cannot easily use external energy feeds (RSB, 2009).

Post-harvesting technology used by the few companies currently processing biofuel crops into SVO is reportedly not efficient. Processing practices currently are resulting in a significant loss and wastage. FELISA estimates, for example, that 60 percent of the oil is not extracted from the oil palm seeds due to poor quality grinding machines (Sulle and Nelson, 2009). Investment in improved technology is necessary, according to Sulle and Nelson (2009), to allow for production gains, as modern machines are able to extract more than 80 percent of the oil from seeds.

The lack of coordinated research being undertaken to develop processing within the country have also served to limit the expansion of processing, which is driving the export of biocrops for processing elsewhere. If the industry follows the export-oriented model of production that has occurred in other sectors in Tanzania, such as the mining, most of the processing will be carried out abroad as Tanzania does not have the capacity either to establish the required infrastructure or operate the facilities (WWF, 2009).

3.4.8 Threats of Biofuel Production

Conflicts/Displacement

Large scale biofuel investments requiring transfer of lands have been subject to criticism with many describing the process as inherently secretive, incoherent and not entirely consistent with existing laws (Kamanga, 2008). The law directs the Village Councils to observe principles of sustainable development in managing Village Land, taking into account the relationship between land use, and the environment in and around the Village Land (Mwanila et al., 2009). Many investors have proposed to carry out socially and environmentally responsible programmes without providing details on precisely what constitutes 'responsible' production or how these objectives will be achieved (WWF, 2009). The system of land accumulation that has emerged has not provided Village Councils with the resources required to protect their lands.

According to reports by the IIED, WWF and Kamanga, local people are not informed of their rights and do not fully understand the process and promises made by companies, on matters such as compensation and employment. Further, environmental sustainability is not included in the final contract (WWF, 2009; Sulle and Nelson;

Kamanga, 2008). Huge tracts of land have been transferred to investor control, sometimes in the absence of thorough land use plans and limited consultation between the TIC, village governments and district authorities (Mwanila et al., 2009).

More than 5000 rice farmers from various regions of the country may be affected by biofuel production. In the Wami area, 1,000 rice farmers are threatened with loss of their land as a result of biofuel production (the project is currently halted (Mande, Sept 28, 2009) and it is unclear whether or not land has been reallocated to villagers). More than 1,000 rice farmers were displaced from their land in Mbeya region to make way for a plantation (there are some reports that this project was also halted by the government) (Sulle and Nelson, 2009). Another 1,000 rice farmers in Ruipa, Mtwara region are also set to be displaced for sugar cane production (Mande, Sept. 28, 2009).

Table 9: Controversial Land Deals

Company/Name of Project	Area	Crop	Problem caused by biofuel production	Status
Kapunga Rice Project Ltd	Mbarali District	Jatropha	Replacing rice farms with Jatropha	Project cancelled
Prokon Ltd	Mpanda District	Jatropha	Area is significant producer of maize	Status unclear
SEKAB	Wami River basin in Bagamoyo District	Sugarcane	Between 1000 and 1400 farmers (ap. 1000 rice farmers) and some pastoralists expected to be displaced; Company aaccused of doctoring its EIA report	Status of project unclear as company seeks financial support
Sun Biofuels Tanzania Ltd	Kisarawe District	Jatropha	Villagers were not consulted; compensation not adequate; massive deforestation undertaken; source of water resources and solid bioenergy; fertile land; accusations of bribes given village leaders to approve leasing agreements	Land acquisition finalised and land clearing commenced early June 2009; Villagers restricted from accessing land acquired by the company as of March 2010

BioShape	Kilwa District	Jatropha	Deforestation in the Namatimbile forest; threatens endemic animals and plants; Mavauji village compensation low; first EIA inadequate; accusations that land not gained legally	Project delayed as one of the investors withdrew; Company has not withdrawn but will be forced to undergo a new start and re-orient its operations
Bio Massive	Lindi District	Jatropha	Rent calculated on the land under cultivation not the total land acquired; Contract makes no specific investment amount to be made by the company while giving it exclusive rights to supply inputs	Lindi district council officials still hold the contract valid but new BioMassive Country Director and CEO has left the country
FELISA	Kigoma Region	Oil palm	Land dispute in court for 350 hectares obtained from 2 villages No EIA completed	
Barrick Mining Company and Export Trading Company (ETC)	Shinyanga and Mara Regions	Jatropha	Initially ETC consulted Diligent Tanzania but because of problems with the district council regarding land use for biofuels this contact has not been restored	Received some opposition as villagers suspect food supply will be endangered
East Africa Biodiesel (EABD)	Dodoma Region	Jatropha	Regional Commissioner (RC) publicly denounced EABD land allocation activity as illegal and ordered farmers to reject Jatropha and tend to cashew nut plants; no compensation offered for village land	
Reports of land loss with no information of company				
		Usungu, Mbeya region	More than 1000 rice farmers displaced to make way for plantation	
	Sugar cane	Ruipa, Mtwara region	1000 rice farmers expected to be displaced	

Sources: Kamanga, 2008; Sulle and Nelson, 2009; Songela, 2008; WWF, 2009; Redfern, June 9, 2008; Roks and van Vlimmerman, 2008; John, March 25, 2010; IFAD, 2009; wa Simbeye, Dec. 31, 2009; Cotula, Vermeulen et al., 2009; wa Simbeye, March 15, 2010; Caniels and Romijn, 2009

Amid reports of farmers being dislocated from farmlands, opposition members of government began to propose in July 2008 that the government halt biofuel projects until

the biofuel law is passed to govern the sector (Afandi, July 22, 2008). In response to mounting criticism against large scale land allocations due to environmental and food security concerns and protests over farmer evictions, the government suspended biofuel investments worth millions of dollars and halted all allocations of land for biofuel cultivation in October 2009. It has, however, indicated that projects already approved or underway cannot be halted. Mega projects, including SEKAB's $500 million US Bagamoyo project (the status of which is currently uncertain), Sun Biofuel's $20 million US Kisarawe project and BioShape's Kilwa project, had already been approved and are set to begin relatively soon. There were also several other projects already in operation when the government issued its moratorium (wa Simbeye, Dec. 31, 2009).

Summary

This chapter provided an extensive overview of the biofuel sector as it has developed in the country. The analysis illustrated that biofuel development to date has been characterised by accumulation of large tracts of land by foreign corporations, alongside the promotion of small scale Jatropha projects. The data reveals that, thus far, the industry has offered more threats than opportunities – with the livelihoods of many smallholders being compromised as investors have acquired large tracts of land with consultation or compensation in many cases. Despite the growing emphasis on small scale Jatropha intiatives, these have largely been small pilot projects often not involving the production of biodiesel, but using Jatropha for soap making or oil for lamps and stoves. The potential for small scale initiaties to expand has been constrained by a lack of cohesive policy and an effective institutional framework for enforcing existing laws.

There is also a noted lack of coordination among researchers to develop technology to process biofuels within the country. Most of the technology is funded by foreign donors and there is a lack of promotion of the sector from within Tanzania - the impetus for expansion comes from external stakeholders. This research has affirmed that biofuel production within Tanzania has thus far not provided opportunities for smallholders to participate. It has instead uprooted small scale producers from their lands, deforested lands essential to their livelihood and so far not provide the projected benefits of higher incomes and infrastructural development that biofuel promoters have championed.

Chapter 4: Discussion and Conclusion

Introduction

To respond to the research questions, *how has biofuel production benefited small scale producers in Tanzania and will small scale producers benefit from future biofuel production?* it was necessary to: a) examine the policies relating to the industry in the country; b) examine the stakeholders involved in the industry, their influence over the biofuel production process and motives; and c) examine how smallholders are integrated into biofuel markets, what power they have, if any, and whether current biofuel production has provided opportunities for income earning/diversification or poses threats to existing small scale production.

This chapter revisits the earlier theoretical discussion on biofuel production in developing countries to conclude that in the context of Tanzania, biofuel production as it has emerged, particularly over the past five years, has evolved in a manner that has not benefited small scale producers. Rather, the sector has developed through promotion of large scale production and companies have displaced small producers. Although the government and foreign donors have, particularly in the last few years, promoted small scale production, the current institutional and structural context of the biofuels sector in Tanzania and imbalances in global agricultural markets result in limited current and future opportunities for smallholders to generate income from the sector.

4.1 Assessing Biofuel Production

The theoretical arguments for promoting biofuel investment were discussed in the theoretical exploration in Chapter 2. In order to fully understand the emerging biofuel

reality in developing countries in relation to existing theoretical debates over the nature of the industry, this study examines how these debates apply to the Tanzanian context.

With a renewed emphasis on the promotion of small scale development throughout the developing world, the production of biodiesel crops, in particular, have been promoted to integrate smallholders into 'lucrative' markets. According to the World Bank, 'enterprising' smallholders will have to improve productivity through technological innovation in order to take advantage of rural development opportunities (WDR, 2008). The basic rationale for promoting biofuels for rural development, in the context of Tanzania, therefore, is to diversify income of smallholder farmers suffering from low levels of productivity and declining incomes, size of land and market share, as well as to provide much needed domestic sources of energy.

In the context of Tanzania, three types of promotion of biofuels have emerged: large scale expansion typically driven by foreign investors; small scale production from foreign investors or joint ventures through contractual arrangements; and small scale Jatropha initiatives promoted through NGOs and companies about which little information exists.

Tanzania's policy framework regulating biofuel expansion is not fully developed; the government is still in the process of finalizing a National Biofuels Policy and has just completed its biofuel guidelines. Laws and policies in diverse sectors have therefore regulated production with no clearly articulated procedures/processes for the industry. Thus, existing policies do not address risks associated with energy crop production such as high food prices, loss of access to land and unfair business practices specifically, with

only passing mention of food security and environmental protection, for example in government laws and policies.

These conditions have created a very weak institutional framework for monitoring investors and laws have not been strictly enforced. Many projects have adhered to certain provisions of current legislative acts such as registration of projects with the TIC (in most, but not all cases) and obtaining the permission of village authorities for transfer of land, but most projects have, in general, not followed specific provisions relating to, for example, obtaining EIAs or compensating villagers for lost land. Vague policy and legislative statements referring to environmental and social sustainability have had little effect on investment behaviour in the country.

The TIC has designated land usage in its 'land bank', which is comprised of land plots for potential investment throughout the country. This process has not been overly transparent; causing many to question what, if any, sort of analysis was conducted on the land to determine whether it was actually available for investment (Envirocare, 2008). Furthermore, villages are required to develop land use plans, outlining which areas are feasible for investment. However, this process has not been transparent either and it has often been difficult to determine if consultations have occurred with the local community, as in the case of a village allocating land to two investors, which was larger than what is legally allowable for allotment.

To assess the way in which production has occurred in the country and its impact on smallholders six debates are revisited: (1) rural poverty and export-oriented commercial agriculture; (2) small versus large scale farming; (3) industrial agriculture/monocropping versus agroecology/multi-cropping; (4) rural poor households'

subsistence versus transnational companies' profits; (5) small scale farming with land access versus dispossession/adverse incorporation; and (6) competing meanings about land and notions of idle, under-utilized, unused and marginal lands.

4.1.1 Rural Poverty and Export-oriented Commercial Agriculture

At the centre of the biofuel debate in Tanzania is the issue of production of biofuels for export versus domestic demand. Biofuel promotion for rural development is premised on the ability of producers to generate energy crops for export and allow poor rural farmers to transition from subsistence farming to export production (Sexton and Zilberman, 2008). Many government and industry biofuel advocates have championed the prevailing view that diversification of agricultural exports is an effective way to reduce poverty and generate rural development in the country. Others claim that Tanzania already has an export bias toward agriculture (eg. Mkandawire, 1987) and further promotion of export production will increase Tanzanian dependence on market prices, to the detriment of food production, in a country already facing food shortages and increasing rural poverty rates.

Opponents of agro-export production argue that participants in international agro-export markets have tended to disproportionately be large, more capital-intensive firms (Berry, 2001: 128). Consequently, the main beneficiaries of the wealth generated by booming agricultural commodities are typically the rich, the male, the landed and the foreign while the losers are typically the poor, the female, the landless and the rural within the developing countries. Thus far in Tanzania, most of the foreign investment that has taken place has promoted export production models, though production is, in most

cases, in very early stages of development. Foreign investors, driven to the industry by the lure of large areas of land, low land rents and the promises of large scale exports, have fueled the drive toward production in the country.

The largest biofuel companies accumulating land, including Sun Biofuels, Sekab and BioShape, have all initiated multi-million dollar projects, with plans to expand the area of land under cultivation, develop processing plants and storage and distribution systems and export large quantities of biofuel feedstocks for foreign markets. Although these large schemes may not materialize, due to financial constraints, public protest or government intervention, large scale biofuel investments are still being pursued. While biofuels are considered to provide a new and lucrative land use for farmers, the pattern of investment and production that is emerging is similar to the commodities produced in the past. Large scale promotion of Jatropha and sugar cane has been linked to the promotion of large scale coffee plantations in the 1990s in the country, which failed to live up to promises of high incomes but instead accumulated land from villages.

Part of the allure for the domestic economy is job creation and income to be earned through value addition from processing fuel within the country. However, critics of biofuel production in Tanzania argue that the country has limited technological capacity and would require significant infrastructural development. There are also very few projects initiated to process fuel within the country (except on a small scale through large local organisations) suggesting that, in fact, biofuel crops will generally be grown to target international markets where rising oil prices will result in high prices for biofuels (Envirocare, 2008). This trend will further disenfranchise the rural poor that biofuels are promoted to help.

Biofuel advocates generally champion the poverty reducing potential of biofuels though employment and integration in markets through contract schemes. Dufey et al. (2007) indicates that despite promises of high wages and incomes for contract growers, employment as wage workers on plantations and contracted outgrowers does not look promising based on previous trends in the developing world. Workers in the sugarcane and palm oil sector have generally faced poor working conditions, with any standards of safe work not being adhered to. In Tanzania, few firms have hired workers as of yet but some reports indicate that jobs that have been created have generally not been high paying. The 400 employees set to be working for Sun Biofuels, for example, are to be paid $3 US/day (Beattie, 2008), while workers for BioShape are paid about approximately $2 US/day (Mwanila et al, 2009). Further, much of the employment is expected to be temporary (Mwanila et al., 2009), leading to precarious employment relationships.

The evidence suggests that biofuel production is reinforcing unequal patterns of exchange between developed and developing countries, reminiscent of other agricultural export crops. In this way, the structure and nature of current markets for biofuel feedstocks are not conducive to smallholder participation on a large scale.

4.1.2 Small versus Large Scale Farming

For decades, neoliberal theorists predicted an end to the small farm era, advocating the consolidation of smaller farmers into larger farms to allow for economies of scale and increased mechanization and greater ability to generate profits and employ a greater segment of the rural population. The Tanzanian farming sector, however, is still

comprised mainly of smallholders with between .9 and 3 hectares. Agriculture has suffered from falling prices and decreasing market share and productivity as agricultural investment has declined in the era of neoliberal restructuring. The government, aid agencies and international donors within the country have, in more recent years, called for a revitalisation of smallholder agriculture. Within this context, the biofuel sector has been promoted to reinvigorate smallholder agriculture through diversifying production and increasing productivity and technological development.

Biofuel critics, sceptical of land acquisitions within Tanzania, make the case that biodiesel and bioethanol production, by its very nature, excludes participation of small scale producers. By virtue of the large capital investment required for start-up, and processing, incorporation of smaller producers will be only through contractual arrangements as dictated by large scale capital. However, biofuel supporters maintain that biodiesel crops, which are generally more labour intensive, are well suited to small rather than large scale production, providing opportunities for smallholders.

The Tanzanian policy environment favours large scale rather than small scale production. The climate in the country is amenable to foreign investment. Foreign investors with initial capital of $3,000,000 US enjoy favourable conditions such as tax incentives, zero taxing for imported capital goods, deferment of value added tax (VAT), 100 percent repatriation of profits, etc. In contrast, support for small scale producers has declined over the last two decades. According to Kamanga (2008), within the Tanzanian government, in general, and the TIC, in particular, the view exists that smallholders are inherently inefficient, backward and unproductive, a sentiment which fuelled early enthusiasm for promotion of large scale biofuel production. Despite recent promotion of

integrating smallholders into biofuel markets in the country's newly passed Biofuel Guidelines, there are currently no formal mechanisms in place to support smallholders.

Although more opportunities are available for larger investors, the process is not ideal from the perspective of international corporations. The process for acquiring land and obtaining a permit to produce biocrops has generally taken 3 years. Land investment is not always secure, with investors risking capital in the project only to have it reversed by the government. This has promoted companies such as Diligent and Prokon to pursue contract outgrower operations, opting to forego the lengthy land accumulation process.

Investors have been able to take advantage of the lack of transparency within the land acquisition process, often failing to comply with procedures outlined in the country's land laws. For example, East Africa Biodiesel did not, according to Habib-Mintz, (2010) even consult with the TIC or district officials before contacting villagers. In order to obtain a lease for lands previously controlled by villagers through customary law, investors have been accused of blatant abuses of both formal laws and informal procedures. Accusations have been levelled at companies for the following offences: doctoring an EIA undertaken by a consultancy firm, making payments to village leaders to vote in favour of leasing agreements, claiming land is unused when it is actually valuable source of food and forest for locals, obtaining land without consulting villagers and misleading local leaders and the community about the nature of the investment and its impact on the village. When the lease has been attained, companies have often failed to meet promises made to villagers in order to acquire the land, such as investing in infrastructure, and providing a large number of jobs. Further, investors have failed to

compensate villagers for land, or compensated far below the value of the land and the resources it supports.

In Tanzania, investors have generally preferred to operate an estate model of agricultural production, citing the low levels of productivity of the smallholder sector as impetus for preferring large scale production; the potential for accruing profits through estate models of production therefore much greater. This trend demonstrates that biofuel production, by its very nature, has supported the expansion of large rather than small scale farming.

4.1.3 Industrial Agriculture/Monocropping versus Agroecology/Multi-cropping

Mainstream development organisations advocate improving productivity of key commodities to promote agricultural export expansion. Food insecurity, according to this conception, has occurred as a result of stagnating agricultural production rather than as a result of monocultural promotion of agricultural commodities.

Within this context, biofuel advocates have attempted to reconcile biofuel expansion with ecologically sound production. Organisations such as the FAO maintain that biofuel production need not displace food production if incomes are generated from biocrops and invested in increasing production of all agricultural activities. It has observed that Tanzania's land is highly suitable for cultivation of cassava from which ethanol could be produced without affecting food security (FAO, 2010).

It is worthy, in principle, to simply argue that biofuel crops will not displace food crops if agricultural production is improved. In practice, it is difficult to reconcile how

agricultural productivity will be improved and biofuel production promoted without compromising the ability of producers to sustainably grow food.

In light of the food crisis and rising food insecurity in Tanzania, concern has arisen about pursuing a biofuels strategy that could potentially replace food crops with fuel crops. Small scale projects have therefore been promoted among policymakers, NGOs and researchers, often through incorporation of biofuels into existing crop rotations. However, the emerging reality is that large investors have managed, within the first few years of biofuel expansion, to accumulate over 600,000 hectares of land within the country. Part of the allure of biofuel production is that biodiesel crops, such as the much acclaimed Jatropha, can be produced on marginal lands. Although investors have maintained that the land they are seeking is, in fact, marginal, in reality it has been the most fertile lands in high density areas that have been appropriated. Most of the large land acquisitions have at least partially taken land that was previously used for production of food or in forested areas essential to the surrounding communities for biomass, medicines and food.

Reports surfacing in 2009 assert that more than 5000 rice farmers from various regions of the country could be affected by biofuel investments either planned or accepted by the government. As of mid 2010, the fate of two proposed investments that would interfere with the production of vital food resources is uncertain. However, the UK based Sun Biofuels has already accumulated land from 11 villages, restricting access to essential land and forest resources for rural residents who were unaware of the impact of the investment on their community.

With the appropriation of fertile lands for which villagers depend on their livelihoods, these emerging patterns of industrial agriculture and monocropping for biofuel production could undermine food sovereignty in the near future, serving to compromise the ability of smallholders to access land, rather than provide opportunities for integration into new markets.

4.1.4 Rural Poor Households' Subsistence versus Transnational Companies' Profits

The model of biofuel expansion that is developing does not provide livelihood opportunities for the rural poor but in fact is an agro-industrial model that has been promoted by international capital and the IFIs. Biofuels produced on a large scale are attractive for foreign direct investments because they turn agriculture into the type of extractive industry that international organisations like the World Bank, the Inter-American Development Bank and the African Development Bank have consistently promoted (Holt-Giménez and Shattuck, 2009). Within this perspective, biofuel crops are regarded as an extension of the model of monocultural, agribusiness led agricultural development that has consolidated resources into the hands of a few individuals and companies (FOEE, 2008).

Current land negotiations in many developing countries are "a breeding ground for corruption and for deals not in the best public interest" according to an IIED report (Cotula, Vermeulen et al., 2009: 7). This has certainly been the case in Tanzania, with transnational corporations able to take advantage of incoherent laws and policies and unclear procedures and mechanisms that should protect smallholders from land speculation.

As biofuel investments increased from 2005 to 2009, the tension between agribusiness profit and household subsistence has become increasingly obvious – the more land being allotted for large scale investments, the more the livelihoods of small scale producers have been threatened.

It is widely perceived that the outgrower model of smallholder production has no negative impacts on land tenure (or food production) and represents a positive model of biofuel production, from a livelihoods perspective (Sulle and Nelson, 2009b; Peskett, 2007; Cotula, Vermeulean, et al., 2009; Arndt et al., 2008) – allowing smallholders to earn an income in a sector otherwise dominated by transnational investors. Such schemes are promoted to provide opportunities for income diversification, particularly for those on 'marginal' lands thereby allowing farmers to retain access to lands, engage in new markets and take advantage of possible value addition through the processing of biofuel feedstocks (Sulle and Nelson, 2009b), considered especially beneficial in a country with a large amount of fallow land (WWF, 2009).

Despite evidence from outgrower initiatives in the sugar sector (see Mwanila et al., 2009) and past experience with castor and moringa that farmers have largely not benefited from contract production, it continues to be widely promoted. However, very little information is available on the details of the contract agreements. Researchers and academics are highly critical of current biofuel production, assuming that contract arrangements are inherently more beneficial for small scale producers and the rural citizenry than large scale plantation arrangements. Contract arrangements, while ensuring markets for crops, generally have low minimum guarantees, if they exist at all. Diligent and Prokon have been praised for producing Jatropha without acquiring any land, and

operating solely through outgrowers. They both, however, have low guaranteed minimum prices (from 100-300 Tsh/kilo). With very little control over the terms of the contract, farmers are once again at the whim of world market prices, on lands that could be used for food production. Contracts fail to shield farmers from drops in the market price. Early reports indicate that yields have not been as high as anticipated and incomes are lower than expected.

Crops such as sugar cane, Jatropha and oil palm are generally low value crops. Profits are not typically derived from the cultivation but from the conversion to the higher value biodiesel or bioethanol. At present, in the absence of production facilities within the country, companies plan to export seeds for processing to their home countries. As articulated by White and Dasgupta (2010), the potential for local communities to benefit from biofuels expansion will be limited, with the largest benefits accruing to multinational companies involved in the production of biocrops, the conversion process and the provision of inputs for processing.

4.1.5 Small Scale Farming with Land Access versus Dispossession/Adverse Incorporation

The expansion of agro-industrial commodity export agriculture has dispossessed people of their land and livelihoods, according to Harvey's notion of primitive accumulation (2005). Biofuel production, according to its critics has brought with it a new wave of accumulation by dispossession as investors from industrialised countries have accumulated land in developing countries at an alarming rate, for the production of biocrops.

This has certainly been the case in Tanzania where multinational capital has been able to divest local people of their lands, with support from the government. Through taking advantage of poorly protected customary claims to land, foreign investors have been able to, at least in most cases, legally obtain large tracts of land while compensating small farmers, pastoralists and other villagers minimally or not at all for their land. Access to land for the rural poor is considered essential for reducing poverty in the country, yet biofuel production as it has emerged, has served to limit access to land and water resources for local communities.

In light of increasing acquisitions of lucrative, fertile land in a context of ambiguously defined protocol for acquisitions and lack of transparency and clarity in the land transfer process, land conflict has arisen and is likely to increase. Penetration of food producing areas, formerly under village control has been accompanied by human displacement and disruption of livelihoods (Kamanga, 2008; ABN, 2007). Farms in areas of the country such as Kisarawe, Kilwa and Lindi have been used for small scale farming, but with the accumulation of land for large scale Jatropha and sugarcane, villagers have been unable to retain access to land (Envirocare, 2008) thus displacing local communities from their lands and source of livelihoods. Through the displacement of smallholders from their lands, some people will increasingly be forced to become labourers in foreign owned plantations.

While biofuel investors have, in general, not received the size of land originally requested - in some cases less than half of the requested area - there were no been formal limits imposed on the size that can be obtained by one investor. BioMassive for example had been approved, as of 2009, for 55,000 hectares of land. Recent guidelines limited

biofuel investors to a maximum of 20,000 hectares may, however, if properly enforced at least disallow foreign companies from acquiring unlimited supplies of land.

The main biofuel investors in Tanzania have taken advantage of inconsistencies in land policies and the weak institutional framework for enforcing existing policies to accumulate land for production. While attempts have been made to develop polices and mechanisms to disallow the accumulation of lands vital to local communities, policies and frameworks are vague and institutions do not appear to have the capacity to properly enforce such provisions.

4.1.6 Competing Meanings about Land and Notions of Idle, Under-utilized and Marginal Lands

The Tanzanian state, in an attempt to 'simplify' land use and property relations within the country, has created three categories of land use in its latest land policies: (1) Reserve, (2) Village and (3) General. Lands deemed to be General Lands by the Government of Tanzania have been open to foreign investment and Village Lands require permission of Village Assemblies to be transferred to general status before investment can take place. Leases are granted through the TIC, the one stop centre for biofuels production.

Although laws recognize customary land relations, stipulating that 'customary rights of occupancy' are equivalent to granted or deemed occupancy, the government has retained ownership of Village Lands. The country's land policies have allowed for investors to lease land for investments up to 99 years at one time (though under new guidelines are to be reduced to 25 years, with an opportunity to renew for 5 years at a

time). The process that allows for the transfer of customary land rights under Village to General status, which is outlined and monitored by the government is unclear, often contradictory and enables foreign investors to manipulate laws in order to allow the granting of land at favourable terms, i.e. very low rates of compensation.

With much of the land in the country not yet held in private ownership, investors have been attracted to Tanzania for its seemingly abundant supply of unused land. In countries where customary land relations still prevail, land which is not used for commercial agriculture purposes has been categorized using labels such as 'marginal,' 'idle,' or 'under-ultised.' In Tanzania, these labels have been applied to land not currently used for commercial agricultural production - land that is deemed to be more 'productively' served by production of commercial crops, often large-scale plantations.

However, notions of 'idle', 'marginal' and 'under-utilized' do not stand up to scrutiny, with researchers, activists and increasingly some policy makers recognizing that most of these areas identified as marginal by land use plans, the government's Land Bank or simply by investors themselves are being used by pastoralists, local populations to grow food crops, or were providing the surrounding communities with access to wood fuel, medicinal plants, wild animals, etc. This has generated calls to increase security of tenure by communities, advocacy organisations and policy makers.

The government, responding to widespread criticism of large 'land grabs' in the country, has halted the granting of further tracts of land for investment until guidelines are in place to regulate the industry. Many international organisations and research institutions have outlined a series of mechanisms and policies that should be implemented to ensure that smallholders are able to retain access to land, such as: (1) promoting local

level engagement; (2) use of short-term rather than long leases; (3) ensuring that local populations are more involved in land decisions and are aware of land laws and regulations, and (4) creating a process that is more transparent and accountable. Given the lack of clarity and ambiguous nature of other laws and policies in the country it will be difficult for lawmakers to ensure biofuel investments adhere to principles of 'sustainability,' and take into account concerns of food security.

The first few years of biofuel production in Tanzania has resulted in smallholders producing crops on land under customary or informal tenure being uprooted to make way for biofuel estates. Competing notions of land use and land availability have, therefore, in the context of the biofuel sector in Tanzania, created opportunities for investors to accumulate land, previously governed by informal, customary land-based social relations rather than opportunities for smallholder to integrate into biofuel markets.

Summary

The prognosis for positive integration into biofuel markets in Tanzania is poor – with the key assumptions about smallholder integration into markets being false or unfounded. On the other hand, several initiatives promoting alternative sources of energy have provided income for some individuals through church, women's and farmer's groups with the support of local and international NGOs.

The failure of smallholders to benefit from agricultural markets has often been blamed, from the neoliberal theoretical perspective, on the inefficiency of developing country markets, and technical factors such as the lack of technological capacity and infrastructure to support biofuel processing. From a varying neostructuralist perspective,

Habib-Mintz (2010) makes the case that institutional and structural poverty and inequalities, combined with Tanzania's system of governance, have provided opportunities for corruption and marginalisation at the local level in particular, where many biofuel investments have been initiated. This has, in this view, precluded the development of a Jatropha-based rural industry that promotes objectives of poverty reduction and the inclusion of smallholders. After studying two Jatropha based projects implemented in the country Habib-Mintz argues that in the absence of a strong regulatory framework for land investment and management and rural development, biofuel industrialisation will actually exacerbate poverty and food security in the country (Habib-Mintz, 2010). From a structural and institutional perspective then, it can be argued that biofuel investment in developing countries is not appropriate as evidenced by the fact that just four years into biofuel expansion the government was forced to issue a moratorium on biofuel investment (ibid).

To place failures solely in the hands of the institutional and regulatory framework within a country is to ignore structural imbalances within the world capitalist economy that limit the integration of smallholders in domestic and international markets. The ability of smallholders to engage in biofuel markets is particularly affected by the political and institutional framework of the country but also by the international context from which biofuel production is promoted.

The findings of this study suggest that biofuel expansion as it is currently developing in Tanzania has limited potential to sustainably integrate smallholders. The current biofuel market thus finds smallholders integrated as contracted farmers to produce seeds to sell to both international investors, NGOs and local companies. NGO

and foreign government sponsored programmes focusing on Jatropha production for domestic energy, using smallholders have been able to produce Jatropha seeds as part of mixed cropping arrangements, but levels of income and yield received is not yet conclusive with projects still in nascent stages. Early reports indicate that Jatropha has yielded lower returns than expected, in its first few years. Many such initiatives have also started as pilot projects through foreign funding only to cease once funding is finished. At this stage many stakeholders, including technology companies, agribusiness and NGOs providing advocacy and training have become involved in Jatropha production for soap making or straight vegetable oil as well, with very little of actual production currently processed to make biodiesel.

Research institutes, educational institutions, foreign institutions and governments have provided support for research initiatives assessing the economic viability of various feedstocks as well as developing technologies to process crops into biodiesel or SVO for use in stoves, vehicles, and for rural electrification. So far these technologies are still being formulated and are not available on a wide scale.

Contractual arrangements have not yet been studied to a large degree as many contracts are still being formalized. Farmers producing through Diligent and Prokon have been supported through provision of free seeds and technical support, but the length of time that farmers have access to extension services and the extent of the services provided is unknown. The Government of Tanzania is not allowing unlimited access to land for large scale biofuel production nor proactively protecting Village Land from large scale biofuel expansion to the detriment of local subsistence farmers (van Eijck and Romijn, 2008). However, much of the land acquisition occurring through the country for

biofuels has been by foreign multinationals and has not promoted smallholder integration in any sustainable way.

The current legal, institutional and policy framework governing biofuels in Tanzania is weak, under-resourced, unclear and not always transparent. Attempts to protect the livelihoods of small scale producers have largely failed when villagers have faced off against biofuel investors. Studies indicate that there is a lack of awareness among villagers about the laws and procedures regarding land ownership and entitlement and land resources (Kmanaga, 2008, Sulle and Nelson, 2009).

Foreign governments and international organisations such as the FAO have also begun to provide funding for developing sustainable guidelines and policies for the advancement of the sector as well as conducting studies to determine which areas are most feasible for production and what methods of processing could best be used in a country with limited infrastructural capacity and access to the latest refining technology.

Tanzania is in the process of developing their biofuel framework, which should in theory dictate how the industry develops. Given that it will be based on current government policies and a lack of institutional and monitoring capacity, the policy may not significantly change the direction of biofuel expansion. The biofuel guidelines, much like policies emerging in other areas of the developing world, advocate the sustainable production of biofuels, ensuring that land will not be leased without village consent, community participation and consultation (what this entails is still not clear) in addition to 'sustainable' methods and models of production and promote community participation.

Despite a moratorium in land acquisitions and the development of new guidelines for the sector, the biofuel sector is not expected to fundamentally change. Foreign

investors driven by high prices for oil will make claims on 'marginal,' 'unused' lands, largely for export, either through plantations or contractual arrangements. On the other hand, NGOs attempt to develop Jatropha value chains that can provide energy for the rural poor that is produced by small scale farmers. Given the structural, institutional and regulatory constraints in the country and the external land pressures and impetus to grow crops for export markets, development of a biofuel sector with a large segment of smallholders is not a foreseeable reality.

Implications of the Tanzania Case

The Tanzanian case suggests that promotion of opportunities for smallholders in biofuel markets will not, by and large, provide the rural development benefits that many advocates have promised. The uncertainty of world commodity prices further exposes smallholders to potentially declining terms of trade, particularly as more first generation biofuel feedstocks are replaced with second generation technologies at an increasing rate.

It is not clear that the promotion of another agricultural crop can make a significant contribution to the smallholder economy in Tanzania. Biofuels touted for both increased income and much needed rural electrification seem to be following the path of other agricultural commodities. The case of biofuels in Tanania illustrates this point. The presumption that biofuel expansion in the country will promote increased agricultural productivity, build infrastructural capacity and provide increased incomes and employment while allowing for the involvement of smallholders is not well founded. Given the time it would take to develop the capacity of the industry within the country, it could take decades for the benefits of value addition to be realized for rural Tanzanians.

Further Research

The scope of this study was broad in terms of outlining the biofuel industry as it has developed in Tanzania in relation to existing debates over biofuel production in developing countries. There are a myriad of external factors that currently impact this sector and will continue to impact the future of biofuels in Tanzania that were not within the scope of this study. Further research should be conducted on issues relating to laws/regulations and policies in developed and developing countries to regulate the industry, global commodity prices, support for biofuel development within developed countries, international and interregional trade policies and agreements, and regional promotion of biofuels production.

In order to provide a more in-depth analysis of the industry in relation to its impact on smallholders it is recommended that further research be undertaken on contract farming arrangements within biocrops and other agricultural commodities to determine how biofuel contractual arrangements compare to arrangements for other agricultural commodities. Far too often, researchers, academics, donors and policy makers have assumed that contract/outgrower arrangements are inherently beneficial for smallholders despite the abundance of available evidence in the cases of other commodities and countries to the contrary. Studies should be undertaken to compare this latest demand for biocrops to other large-scale agricultural initiatives of the past such as the aforementioned Tanzania-Canada wheat project, large-scale coffee initiatives as well as the outgrower schemes involving the production of moringa and castor oil. Further, an examination of measures/policies that can more adquately address the threats to the livelihoods of

smallholder producers is required, as well as a thorough review of existing proposals submitted by NGOs, research organizations, policy makers and academics.

As the industry evolves in Tanzania and other developing countries, more information will surface on the relative success or failure of biofuel production, particularly in relation to smallholders. The hope is that this study provides a preliminary overview of the key issues and challenges of promoting biofuel production for rural development.

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National Bureau of Statistics. http://www.nbs.go.tz/.

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Tanzania Investment Centre. http://www.tic.co.tz/.

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United Republic of Tanzania. http://www.tanzania.go.tz/.

Investors/Organisations Involved in Biofuel Production in Tanzania

Bioshape Tanzania. http://bioshape.phpwebhosting.com/en/node/73.

Diligent Energy Systems. http://www.diligent.nl/index.php?id=29.

D1 Oils. http://www.d1plc.com/.

KAKUTE, http://kakute.org/.

Partners for Development. http://www.pfd.org/where-we-work/tanzania.

Prokon Renewable Energy Ltd. http://www.prokon-tanzania.com/about.html.

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